RAILROAD GAZETTE

FRIDAY, AUGUST 1.

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Contributions.

19-in. - 26-in. Mogul—Brooks Locomotive Works.

Schenectady Locomotive Works,
SCHENECTADY, N. Y., July 28, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of July 25, under the above heading, we note the following statement: "The mogul locomotive illustrated herewith is a standard of the New York Central & Hudson River Railroad. The first one was built by the Brooks Locomotive Works from *their own* design. Recently large orders have been given other builders, etc, etc."

As this misstatement has before appeared in print, we think it but justice that we now ask that it may be corrected.

At the time the New York Central were questioning the policy of increased power by the use of heavier locomotives, several conferences took place between Mr. Buchanan and our Superintendent, Mr. Pitkin, which resulted in our building a locomotive *for trial*, Mr. Buchanan determining the general design as to size of boiler, cylinders, drivers, weight, etc. This engine was then placed in service on their road several months before any orders were placed for this type of engine, and was identically the same as covered in the specifications furnished the Brooks Locomotive Works by the New York Central people, and to which they conformed in building those ordered from them. This engine was accepted by the New York Central as one of the engines covered by a contract of 50, only 10 of which were built by the Brooks Locomotive Works.

In addition we would say that we are building for the New York Central & Hudson River Railroad Co. this year 137 locomotives, all of the freight engines being duplicates of the "mogul" to which we above refer.

SCHENECTADY LOCOMOTIVE WORKS.

Working Railroads by Electricity.

BRIDGETON, N. J., July 23, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

At this late date I would like to reply to a few points brought out in an article on page 364, third paragraph, of your issue of May 23 last, upon "Electrical Railroads." Having been absent from home, this article escaped my attention until quite recently.

Being one of the men referred to who "were not railroad men, and scarcely electricians," I will say that I do not profess to be either, but only belong to a class of men known as mechanical engineers, some of whom may, perhaps, in the future, be called upon sometimes to act as umpires between the two first-mentioned classes—the railroad men, who very properly, from their point of view and from that of the companies who employ them, are conservative as regards any radical departure from old methods; and, on the other hand, the electricians, who have nothing but new methods, of the newest kind, to offer.

When, in referring to an electro-motor, I used the expression "as simple as a grindstone or a coffee-mill," I used it advisedly, and, of course, referred to it kinetically, as a moving mechanism, in which aspect all three machines, in common, consist simply of a loaded shaft revolving in two bearings. I did not refer to the static construction of the armatures, which, by the way, can hardly be called "complicated;" for although there are embodied a good many parts, these parts are mostly made in duplicate. The "careful attendance" which these motors formerly received and required is now in a great measure avoided by the use of self-lubricating devices and by the substitution of carbon "brushes" for he aforetime troublesome bunch of copper ribbons. These allow the shaft to revolve either way, and are, mechanically speaking, nothing more than an additional bearing embracing the commutator, which itself is fixed to the shaft and is essentially a part thereof, somewhat enlarged. A necessity for "perfectly dry surroundings" has, I believe, been wholly or partially obviated by a water-proof construction of field and armature, and even if it had not it is easy to imagine the covering of the machine with a waterproof sheet metal case.

Furthermore, I fail to see anything "ludicrous" in the mere fact of attaching a motor to each axle of a car (or perhaps to one or two of them only), in view of the fact that this is the precise method now in practical use, with very satisfactory results, upon between one and two thousand cars on the electric street railroads of this country. These cars, moreover, are sometimes "washed" without making the "motors worthless"; and the attendance does not seem to be very "appalling," in spite of the fact that such cars are run under far more unfavorable conditions in regard to mud, snow, water, sand and dust than are the cars upon our steam railroads. They are also under the disadvantage of carrying more complicated gearing than would be necessary upon regular railroad cars, with their higher speed and room for greater diameter of armature.

It is true that "a train runs better and smoother when pulled than when pushed," but who has yet demonstrated that it does not run *still better* when operated all along the line as a unit than it does when pulled? Obviously this would be the case in regard to reducing stresses upon couplings and in avoiding the heavy side-pull upon the inner rail when rounding curves.

In regard to the slightly "increased weight" of a number of small motors over one large one of the same aggregate power, I have no exact figures at hand, but this point is of small consequence, because either a large motor or a collection of small ones, strong enough to draw a train, can be made very much lighter than is necessary for traction purposes in a locomotive. Hence an electro-locomotive must be heavily ballasted with artificial dead weight to do even as well as our present steam locomotives, which, even at their best, are not nearly heavy enough for their work when ascending some of our ordinary grades. The great and vital advantage of putting individual motors upon the cars is a saving of this artificial dead weight by utilizing the inherent weight of the car itself, which is far in excess of the amount necessary for traction, thus enabling us to run a train with a less amount of actual power, and to mount steeper grades, than we can at present.

In regard to the attendance upon and durability of a number of separate motors, I think there would be less difficulty than with street car work on account of the unfavorable conditions above referred to. This is especially the case with the newer types of motors, which in stationary work have proved themselves capable of running for weeks and, perhaps, months with absolutely no attendance at all. One great advantage, which the writer has elsewhere pointed out, in sub-dividing the motors is that a large proportion of them, say half or more, may be entirely broken down without stopping the train—the direst effect being the attainment of a somewhat slower speed. If, on the other hand, one large motor is depended upon, the slightest accident, as the breaking of a single wire, may entirely disable the train. Furthermore, the individual motor system enables trains to be subdivided at branches in the line, without the necessity of having separate (and unnecessarily powerful) locomotives for each branch. In cases of accident, also, as, for instance, a collision at the head of the train, the uninjured cars can be got out of the way individually, as is not the case if a disabled locomotive is depended upon. In general this system *saves power* by enabling each car to pick up at any given moment the exact amount of energy it requires for the load it happens to have aboard, without carrying its arbitrary share of the framework, running gear and ballast of an electro-locomotive. Such an evil, with a given size of locomotive, would of course be greater with short trains than with long ones.

This whole subject is at the present time a very interesting one, and I sincerely hope that opinions upon both sides of the question will be very freely ventilated by railroad men and electricians, as well as by those who stand between.

OBERLIN SMITH.

Truss Deflection.

BY J. B. JOHNSON,
Professor of Civil Engineering, Washington University.

For any well designed truss, where the stresses are all direct tension and compression, the deflection, when erected and loaded, results from two causes: (*a*) The slack or looseness at the joints, as when pin holes are larger than the pin, and (*b*) the distortion of the members under load. Where the truss can be wholly tightened up by end nuts or turnbuckles, as in a Howe truss bridge, or in case of a riveted structure, deflection results only from the distortion of the members under load.

The customary method of computing deflection from load is to take account of the distortion of the chord members only. This gives very erroneous results, unless we apply another common rule, which is to double our computed deflections. For the deflection resulting from the distortions of the web members is in general about equal to that from the chord members, depending, however, on the ratio of height of truss to panel length.

It is very desirable, therefore, to have a short rule for finding the true deflection of any truss, of any design for any given loading, account being taken of the distortion in all the members which contribute to this deflection. Such a rule is found in the following way.

The internal work of resistance is equal to the external work of distortion. This external work for a load placed at a joint is equal to the load into the deflection of the loaded point, divided by two. The total external work is equal to the sum of all the products of the stresses in the members into their respective distortions divided by two.

If now we suppose, for the moment, that all the members are absolutely rigid but one (which may be any one) and a load P be put at the joint whose deflection is to be found, we have the internal work represented by the distortion of the one elastic member, and hence,

$$\frac{P}{2}\frac{D}{} = \frac{U}{2}\frac{z}{}$$

$$\text{or } \frac{U}{P} = \frac{D}{z} \qquad (1)$$

Where P = load at point.
" D = deflection of point.
" U = stress in given member.
" z = distortion of given member.

If, now, we make the load at the point 1 lb., and let the resulting stress in the member be u, then we have

$$u = \frac{D}{z} \qquad (2)$$

Or

The ratio of the deflection of any point in a truss to the distortion of any given member is the same as the number of pounds of stress in the member resulting from placing 1-lb. load at the point.

Or

The deflection of any point in a truss due to a distortion of any given member is equal to that distortion multiplied by the number of pounds of stress in such member caused by placing a 1-lb. load at the point.

If this be true of the distortion of any truss member it is true of all of them, and hence of the sum of all of them; hence

The total deflection of any point in a truss is equal to the sum of the products of the distortions of the several members by the corresponding stresses produced in such members by placing a 1-lb. load at the point whose deflection is desired.

Now, the distortion of any member depends upon the stress per square inch produced in it, and in terms of that unit stress is

$$\text{Distortion} = \frac{p\ l}{E} \qquad (3)$$

where
p = stress in member in pounds per square inch due to actual load on truss for which defection is to be computed.
l = length of member in inches.
E = modulus of elasticity of material = 29,000,000 for iron and steel.

If, therefore, we let u equal the stress in any given member due to 1 lb. placed at the point whose deflection is desired, and we let Σ represent the sign of summation, then we may write

$$\text{Deflection of truss} = \Sigma \frac{p\ u\ l}{E} \qquad (4)$$

the quantity $\frac{p\ u\ l}{E}$ being computed for each member of the truss and the sum taken.

If the point whose deflection is desired be the middle point of a truss supported at the ends, or the ends of a cantilever or drawbridge, then all the products of $\frac{p\ l}{E} \times u$ will be of one sign, and hence the arithmetical sum is taken; but if the point whose deflection is desired be any other than these, some of the products will have an opposite sign, and hence the algebraic sum must be taken.

The notation is that ordinarily used as to p, l and E, and u is chosen for the ratio of reduction in order to make a formula easily remembered. The formula as here given may be thought of as "pul(l) over E," and the writer usually thinks of it and speaks of it in this way.

For the working load on a truss, for which the truss has been designed, the several values of p would be known, and of course l and E would be known for every member. The only factor remaining to be computed for each member would therefore be u. Since this is the stress in the member due to 1 lb. placed at the point in question, it may best be found by a graphical diagram, using a load of 1 lb. at the point, and then scaling off at once the corresponding stresses or values of u for the several members.

By putting down all this data in a tabular form the computation is readily made.

For working loads, however, the value of p will be approximately uniform throughout the tension members, and another nearly uniform value for the compressive members. If we take average values for these, and call them p_t and p_c for the unit stresses in the ten-

sion and compression members respectively, then for any particular form of truss a formula may be derived which will greatly shorten the work of computation.

Thus, for a Pratt truss we have

$$\text{Deflection} = \frac{p_t + p_c}{2\,E\,h}\left[(n+2)\frac{n\,d^2}{4} + (n-2)\,h^2\right] \qquad (5)$$

Where

p_t = average unit working stress in pounds per square inch in the tension members.

p_c = same for compression members.

E = modulus of elasticity = 29,000,000 for iron or steel.

h = height of truss in inches.

d = panel length in inches.

n = number of panels in bridge.

Numerical Example.

Find the deflection of a Pratt truss, 200 ft. span, 12 panels, with a height of 400 in., or 33 ft. 4 in., the panel length being 200 in. If the average maximum tensile stress for both dead and live load be taken as 10,000 lbs. per square inch, and the average compressive stress as 7,000 lbs. per square inch, the total deflection is:

$$\text{Deflection} = \frac{10{,}000 + 7{,}000}{2 \times 29{,}000{,}000 \times 400}\left[(12+2)\frac{12 \times (200)^2}{4} + (12-2)\,(400)^2\right] = 2.49 \text{ in.}$$

If the deflection due to live load only is desired, then use for the values of p_t and p_c the stresses due to that load only, and the result will be corresponding deflection.

Inelastic Deflection.

This is the deflection from the theoretical cambered position, due to slack at the joints of a pin-connected truss. This slack whould be one-half the difference in size between holes and pins, and would occur at both ends of all members except the top chord. We might call this total movement for each member, say, 0.02 in. The effect of this in causing deflection would be the same as that much distortion from internal strain; and hence, instead of having for each member a distortion given by the expression $\frac{p\,l}{E}$, we have simply 0.02 in. for all, and hence the inelastic deflection due to this looseness at the joints is 0.02 in. $\times\ \Sigma\, u$. That is, sum up the u's for all the members, except the top chord, and multiply this sum by 0.02 in. to give inelastic deflection.

Or, for a Pratt truss, the inelastic deflection is

$$\frac{1}{200h}\left[(n^2 - 2n + 8)\,d + (n-4)\,h + 2n\sqrt{h^2 + d^2}\right] \qquad (6)$$

For the truss taken above, this gives for the inelastic deflection 0.49 in.

Hence, when erected and loaded with its full working live and dead load so as to produce stresses of 10,000 lbs. per sq. in. in tension members, and 7,000 lbs. per sq. in. in compressive members, its deflection below its computed cambered position would be 2.49 + 0.49 = 2.98 in., or, say, 3 in.

Other forms of trusses could also have similar equations computed for them in place of working out the general equation (4).

Wear of Tires as Affected by Counterbalance.

Our readers will remember that there was a discussion at a Western Railroad Club meeting last spring (see *Railroad Gazette*, April 25, p. 282) on the subject of the uneven wear of driving tires. It was stated that there was a difference in the wear of the left and right hand wheels and of the rear and front wheels, and no satisfactory explanation was offered of the cause of the variation. Since that time the Chicago, Burlington & Quincy has received reports on the wear of tires on engine No. 128 since September, 1889. This is a class "H" engine, a mogul express, having 19-in. cylinders, and the diagrams show the condition of the tires after being some time in service before and after the counterbalances were changed.

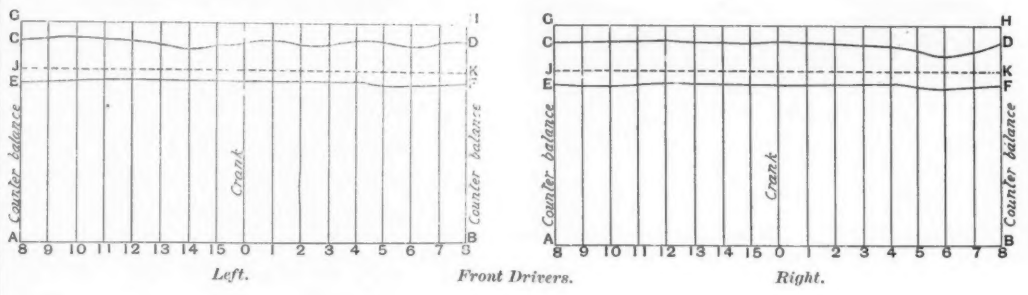
These diagrams are constructed as follows: The line $A\,B$ represents the development of the inside of the tire if cut in two at a point directly opposite the crank. The irregular lines $C\,D$ and $E\,F$ are constructed by laying off from the line $A\,B$ at various points the thickness of the tire at corresponding points, the measurements being taken directly opposite the spokes as a matter of convenience. The direction of rotation is in each case to the left; from B to A. The diagrams were taken Sept. 2, 1889, and in April, 1890. The line $C\,D$ as compared with $E\,H$ shows the wear from Aug. 13, 1888, to Sept. 2, 1889, the total mileage during that time being 93,512 miles in main line passenger service. The line $E\,F$ compared with $J\,K$ shows the wear from September, 1889, to April, 1890, the mileage being 45,800 miles, in the same service as before. $J\,K$ is the line to which the tires were turned September, 1889, the first turning. $A\,G$ is 3 in. and $A\,J$ $2\frac{23}{64}$ in.

The sections of the tires show the original sections and the wear before the first turning.

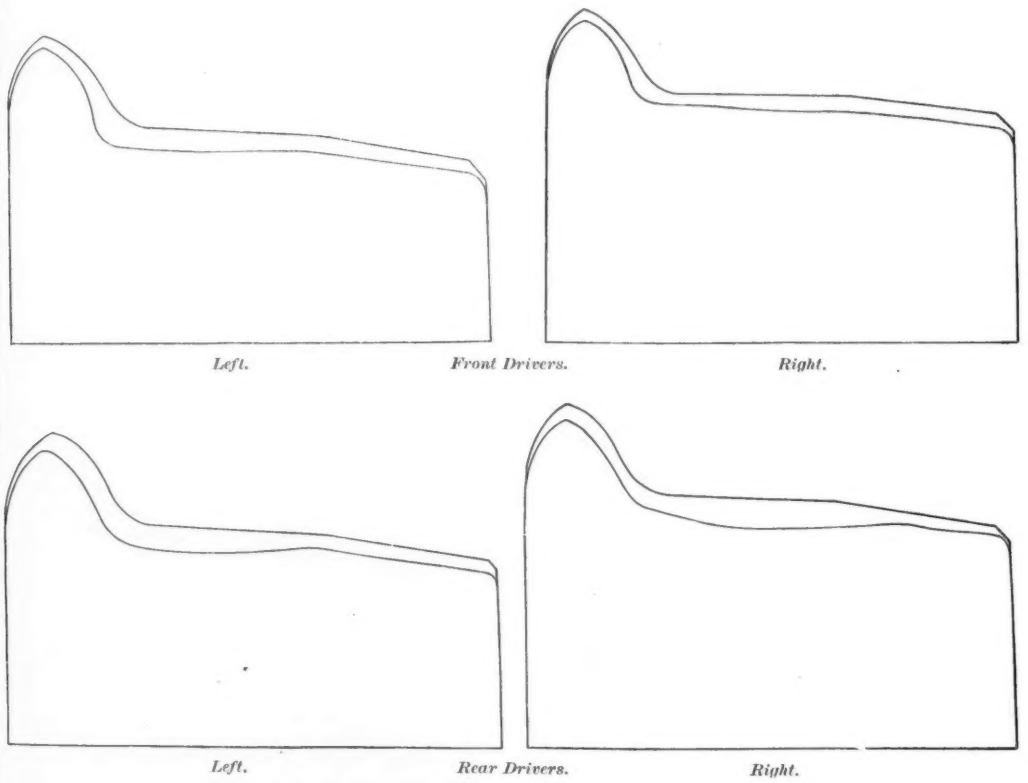
When this engine was in the shop September, 1889, the counterbalance was corrected, and since that time a decided change has been observed in the wear of the tires, which is much more uniform. It is to be noticed that the middle tires have worn rather more unevenly than those on the back or front, the left middle wheel being the most uneven. The flat spots are not in the same places that they were when the tires were first turned; that is, before the counterbalances were changed.

Previous to that time the wear of both middle wheels seemed to be greatest at the crank. The greatest wear is not in the same place on the two wheels. On the left wheel it is on top when the piston is in the back end of the cylinder, while on the right wheel it is nearly opposite the crank. So far as can be determined, the wheels are counterbalanced exactly alike, and the effect of the counterbalance on the wear, if any, should be the same on both wheels. It was at first thought that these tires were not of good or uniform material, but from the mileage of the tires per one-sixteenth of wear, they seemed to be considerably better than the average.

This information is the first of the kind on record that we know of, and if merits attention, because if a change in the counterbalance materially affects the wear of locomotive tires, this effect may be worth taking into account in counterbalancing locomotives.



Diagrams Showing Tire Wear for Two Periods.



Tire Wear before First Turning—93,512 Miles.

TIRE WEAR AS AFFECTED BY COUNTERBALANCING.

Webb & Thompson's Train Staff Apparatus.

The recent adoption of the train staff system on a short section of the Shore Line Division of the New York, New Haven & Hartford (between New London and Niantic), will awaken interest among American railroad men in this English system, and we take occasion to illustrate and describe in this issue an apparatus devised for use on the London & Northwestern by Mr. F. W. Webb, the well-known mechanical engineer of that company, and Mr. A. M. Thompson, signal engineer of the same road. The drawings were sent us by the inventors and this description is much fuller than those heretofore published. We preface the description of the

apparatus by a brief historical sketch furnished us by an English correspondent.

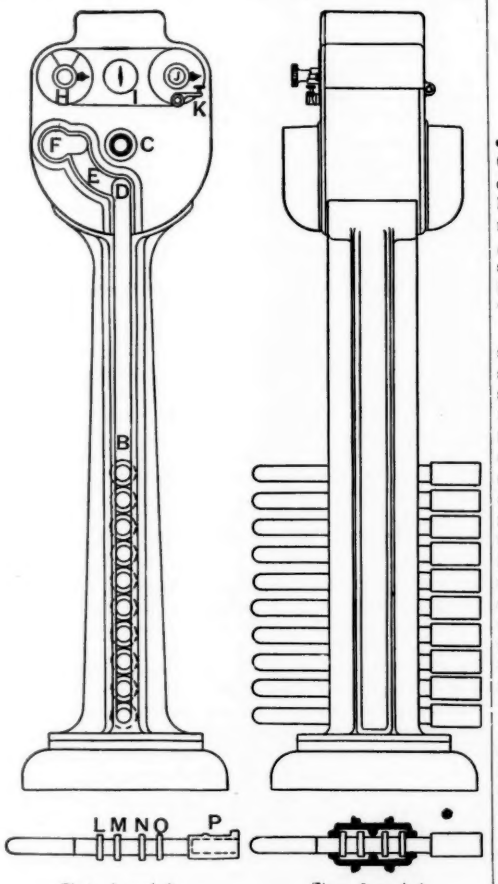
About thirty years ago one of the engineers of the London & Northwestern, who was responsible for the working of a single line through the Standedge Tunnel, three miles in length, made arrangements that no train should enter the tunnel unless the engineer was in possession of a certain staff, a piece of brass-bound wood, which he carried with him through the tunnel and handed to the signalman in charge at either end. This was found to work so satisfactorily that the system was extended to other lines, and in the year 1860 the Board of Trade made it one of the requirements for single-line working. It was soon found necessary to employ tickets in addition to the staff, as when three trains, say, were timed to leave A for B before a train was timed to leave B for A, if the first train carried the staff the second train could not depart until the staff was returned. If there was no return train a serious delay resulted, and consequently tickets were given to the first and second train, the third train carrying the staff. These tickets were placed in a box at the staff station, the box being provided with a special form of lock, the key for which was formed with the staff, so that the ticket could not be obtained unless the staff was at hand, and as an additional security engineers were ordered not to accept a ticket unless the staff was at the same time exhibited. But as traffic further developed, yet further modification was needed, as with an irregular traffic it was frequently found that the staff was at the wrong end of the section; and to meet this demand the apparatus shown herewith was devised. It obviates the difficulty perfectly, a staff being obtainable at either end of the line with equal facility.

In using the train staff and ticket system, the English roads employ the usual block signal instruments for protecting trains from rear collisions; but with the Webb & Thompson system the staff apparatus alone is used, as it is mechanically impossible to have more than one staff in use at a time, and consequently it is in itself an admirable block instrument.

Each staff is provided at one end with a key to unlock the switches of side tracks at intermediate points between the staff stations. The switches are provided with a lever for working them, and this lever is secured in position by a special form of lock. This lock is actuated by the key formed on the staff, and directly the lever is unlocked and the lever moved the staff is itself locked in the lock, and it cannot be withdrawn until the switch is reset for the main track and locked in position.

DESCRIPTION OF APPARATUS.

We will assume that a railroad with four stations A, B, C and D is to be worked. One apparatus is fixed at



Figs. 1 and 2.

Figs. 3 and 4.

A, two at B, two at C and one at D. A sufficient number of staffs are stored in the perpendicular slot in each machine. The staffs for the section between A and B are of a different form from those between B and C, and those between C and D are of a form similar to those between A and B, and so on alternately; thus a staff sent from A cannot be used by B for the apparatus between B and C. We will now assume that a train is ready to start from station A. The signalman at A rings to B by depressing the key *K*, figs. 1 and 5; B acknowledges the signal, and A then rings to B the description of train he is sending, in accordance with a prearranged code. B acknowledges the signal, and A then rings that he wants to withdraw a staff, and he at once turns the right-hand pointer from the right-hand side of the dial *J* ("bell signal") to the left-hand side ("staff lock"), thus switching the line wire from the bell to the electric lock of his apparatus. B similarly turns his dial from "bell signal" to "staff lock" and depresses the key *K*.

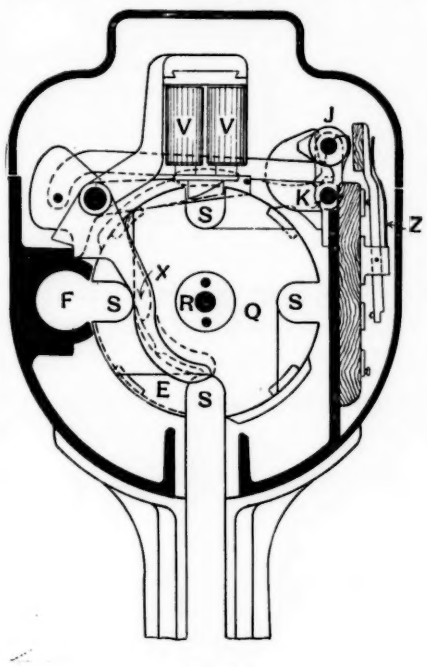


Fig. 5.

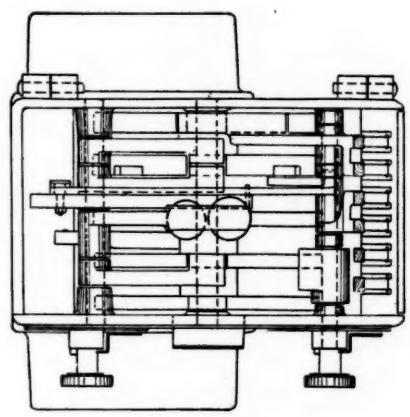


Fig. 6—Plan of Fig. 5.

The apparatus is controlled electrically by means of a single line wire, and the depression of key *K* by B (both stations now having their locks switched on to the wire) sends a current either from the copper or zinc pole of his battery, according to the position of the commutator *Z*, figs. 5 and 7, which is reversed as a staff is put in or taken out of the column. In this case we will assume that B sends a current from the copper pole of his battery. This current passes through a galvanometer *I* in B's apparatus, through a similar galvanometer in A's apparatus, then through a polarized switch (fig. 7), to the electric lock, and thence to earth. A watches the galvanometer needle, and as soon as it moves over he withdraws a staff from his apparatus. When the staff in its upward movement reaches the extremity of the perpendicular slot *D*, fig. 1, it lifts the arm *X*, fig. 5, and thereby lifts the coils *V V*. These coils in rising unlock the disc *Q* and permit the staff to be moved through *E* to *F*, and thence withdrawn from the machine.

The withdrawal of the staff turns the drum *Q* a quarter of a revolution and reverses the commutator from the copper to the zinc pole, consequently cutting off the copper current sent by B. The galvanometer needles in both machines fall back to zero, thus showing B that A has withdrawn a staff. The staff withdrawn is now handed to the engineer, and the train goes to B; and as long as this train is in possession of the staff no second staff can be obtained, and consequently no second train can be despatched, because A can now only send a current from the zinc pole, which has no effect on B's apparatus, and B can only send a current from the copper pole, which has no effect on A's instrument. As soon as the train has arrived at B the staff is given up and placed in the machine; as it is put in the drum is turned back a quarter of a revolution and the commutator reversed, thus switching the wire on to the zinc pole. Both A and B can now send and receive current from the zinc poles, and consequently a staff can be obtained by permission from either A's apparatus or B's apparatus and a second train despatched. The staff taken out again causes the commutator of the apparatus from which it was taken to be reversed, and the apparatus is thus placed out of unison again. As soon as a staff is taken out the right-hand dial is turned back from "staff lock" to "bell signal," the normal position. The bell signals are given on the same wire with alternating currents, thus avoiding any danger of a bell current affecting the electric lock.

The most important feature of the apparatus is the electric lock. The locking bolt being very heavy, a magnet and current of great power would be required to lift it through the space necessary. To avoid this the inventors have placed the poles of a comparatively small magnet normally in contact with the bolt, which forms an armature, and the magnet coils are lifted mechanically by the tail piece *X*, which is actuated by one of the projections *L M N O* on the staff, fig. 2. Thus if a current is flowing through the coils the small magnet easily lifts the heavy bolt, but if no current is flowing the bolt is left unmoved.

The drum *Q* carries, besides the disc for electric locking, four other discs, three of which are for mechanically locking the drum after the manner of an ordinary lock, the staff with its projections being the key. This prevents any tampering with the apparatus. The five discs are mounted about 1 in. apart on a sleeve *R* which rotates on the shaft passing through its centre. The notches *S, S, S, S*, are in all the discs and it will be seen that the removal of a staff rotates the whole. When a staff is returned to the magazine the discs are rotated in the opposite direction.

The polarized switch is illustrated by fig. 7, and a diagram of the electric lock and the commutator switch is added to explain the working. The principle is similar to the Siemens relay, two tongues being used. A current from the copper pole is passed through the coils *A*,

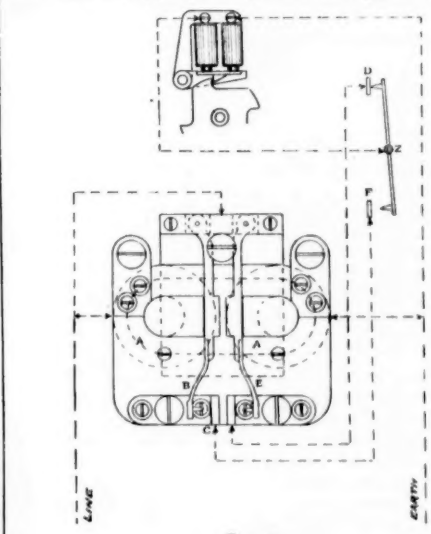


Fig. 7.

which are of a high resistance, to earth. This attracts the tongue *B*, which makes contact with *C*. A free course is now given to the current, which passes through the commutator switch *D* to the electric lock and to earth. If a current from the zinc pole is sent, tongue *E* is attracted, but the commutator being switched for the copper current, the zinc current is stopped at *F* and no result is obtained.

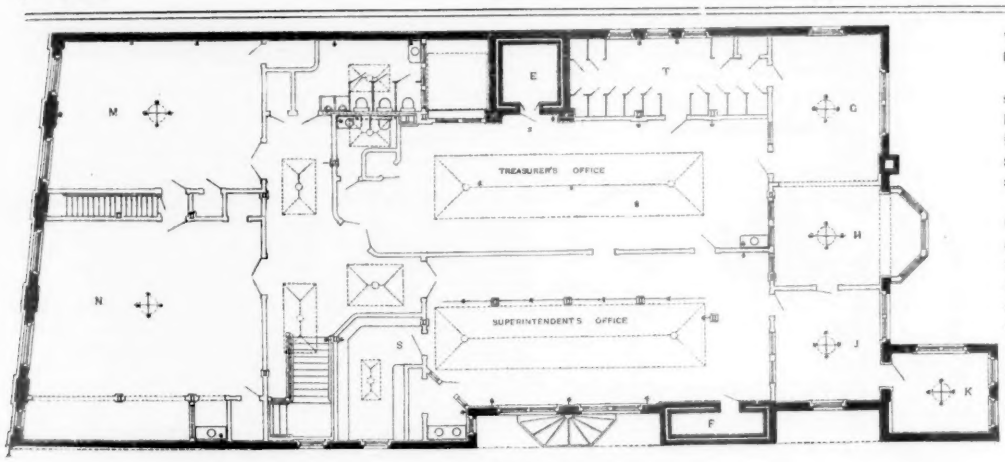
The apparatus is manufactured by the Railway Signal Co., Limited, Fazakerley, near Liverpool, England.

New Station Building of the Boston, Revere Beach & Lynn Railroad at Boston.

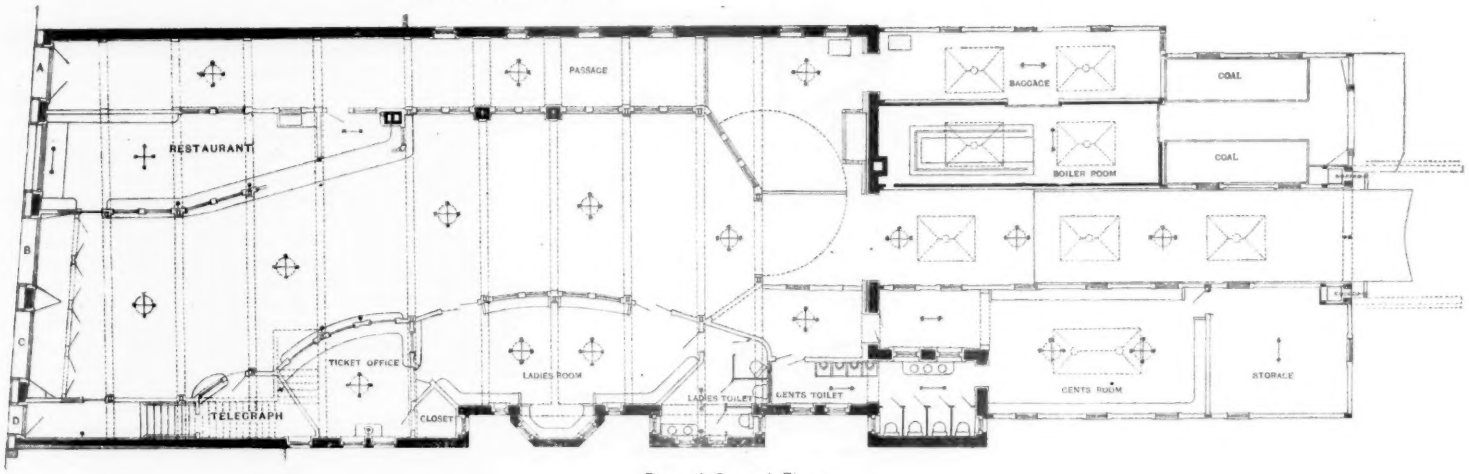
This station recently opened is designed to meet the requirements both of a terminal passenger station and of a ferry. The location, on Atlantic avenue, Boston, is in one of the most crowded and valuable sections of the city, combining as it does the frontage on a broad avenue of the city with the wharf requirements of a ferry line. The design and manner in which the details of the work have been carried out are interesting as showing how a station containing all modern improvements and facilities for handling the great summer traffic which this road carries to the northerly beaches could be erected upon the somewhat narrow and restricted, irregular area that was available. The work was planned by the Superintendent of the road, C. A. Hammond, C. E., assisted by George Finneran, Architect.

The foundations are of granite blocks resting upon hard clay for the front portion of the building, and upon piling for the rear portion, and are very substantial. Although the structure as built is but two stories in height, the foundations are sufficiently strong to permit more stories to be added when required. The foundation piles were cut off at grade 4 and capped by 12 × 12-in. hard pine timber with transverse tie caps of the same size framed in.

The piles are driven in groups of nine under each main



Plan of Second Floor.



Plan of Ground Floor.

BOSTON STATION OF THE BOSTON, REVERE BEACH & LYNN RAILROAD.

pier, not over 3 ft. apart on the centres. The cap timbers are halved over the caps of the piles, making flush joints on top and tying all piles firmly in position. The first floor cross girders, 12 × 14 in., are supported on brick piers, covered with iron plates and resting on granite piers built on pile capping to within 4 ft. of the floor. Two intermediate supports, 12 × 12 in., each resting on a pile, also support the floor girders, which are about 25 ft. span each. Floor joists are 3 × 12 in., 2 ft. apart on centres, covered with 2-in. plank for the first floor.

The space to which the station was limited lies between Foster's Wharf on the right and Rowe's Wharf on the left, the frontage on Atlantic avenue being 57 ft. 10 in. The main building is of freestone with granite sills and thresholds for the first story and brick above. It occupies the full frontage and is 119 ft. 4 in. deep from the street to the beginning of the drop. The space for the drop is central, 12 ft. wide by 72 ft. 8 in. long to face of piling, and the slip for ferry-boat is 107 ft. 4 in. long on centre line, extending to the harbor commissioners' line. The width on this line, which makes an angle of about 60 degrees with the line of the front, is 72 ft. The width of the station between the side walls, to be spanned by the iron floor girders, varies considerably, but the main spans are approximately 25 ft. The bays are about 10 ft. centre to centre. The cross girders of the second floor are supported by vertical columns with outside and inside angle brackets, to which they are riveted, and are made continuous through the columns. These columns are twenty in number, 8 × 12-in. section, two in each bay, which therefore requires three cross girders, and rest upon plates supported by the foundation piers. They are made of two 8-in. channel beams, each weighing from 30 to 38 lbs. per yard, latticed on two sides with 2-in. × ¼-in. flat bars at about 60 degrees angle, or 1 ft. from centre to centre of rivets on each channel flange. The columns are 30 ft. high, and extend to and support the roof beams. The dimensions of all the iron work are proportioned to and vary with the loads. The roof beams are built up of two sticks of best Southern pine 6-in. × 12-in. each, laid one above the other to form a 6 × 24-in. section with 2 × 6-in. oak keys halved in between the beams every 2 ft. and ⅝-in. to 1⅛-in. through bolts between. The rafters are 6 in. × 6 in., covered with pine boards with five-ply tarred and gravel roof. The pitch is ¾ in. to 1 ft.

The architecture is of the round arch style, with a moderate tower, the peaks and pediments finished with copper. A clock face 5 ft. 7 in. in diameter occupies the front centre above the windows on the second floor.

There are four entrances at the street level. The first, *A*, is the exit or direct passage 9 ft. 6 in. wide, which, by means of an ingenious arrangement of gates, permits of the safe and convenient handling of crowds by allowing passengers to reach the street from the ferry slips without passing through the main entrance passage of the station when the same is occupied by passengers waiting to take the boat. This exit passage may at other times be used for receiving and delivering baggage without taking it through the main station. The two principal entrances, *B* and *C*, are in the centre, each 9 ft. 7 in. wide. On the extreme right is a door, *D*, leading to a vestibule and staircase to the offices of the company on the second floor.

The height of the rooms on the first floor is 18 ft. 2 in.; of those on the second, 12 ft. 8 in. Fig. 1 shows a plan of the first floor. On entering the first room to the right, partially occupying a space under the stairs, is the telegraph office; and, beyond, the ticket office, provided with three windows opening into the main passage, and a window and door communicating with the ladies' waiting room beyond. It is provided with a closet and washbowl. The ladies' room, on the right, is of varying widths, averaging about 15 ft. × 40 ft., with a bay window alcove and half octagonal skylight over it. At the further end of this is a ladies' toilet room with tiled floor, washbowls, etc., well arranged and convenient. Beyond this, still on the right, and partially occupying the space beside the drop, is the men's lavatory with tiled floor, washbowls, closets, etc. It is from 5 ft. 10 in. to 10 ft. wide by about 33 ft. long.

Leading from the main passage of the station is a passage 10 ft. wide between the drop and lavatory, which forms the entrance to the gentlemen's waiting room, 17 ft. × 30 ft., which has fixed rattan seats around the walls and is well lighted by an overhead skylight, this portion being of one story only. Beyond this is a room 17 ft. × 20 ft. for storage, and to contain the hydraulic machinery for the drop.

On the left of the main entrance next the street is a room about 14 ft. × 38 ft. to be used for a restaurant, where hot lunches will be served. It has a large show window at the street front. Beyond the restaurant is a space for a news stand, provided with counters and with a door opening into the exit passage on the left. The remaining space on the first floor of the main building is devoted to a spacious hall, the dimensions of which are about 25 ft. × 100 ft. long, having fixed rattan seats on the left-hand side besides affording standing room for a thousand persons in case of a rush, which in the summer time is by no means uncommon. At its extremity is a combination sliding and swinging gate which may be placed in three positions: across the entrance to the drop from either the main station or the exit passage, or throwing both open, so that the incoming and outgoing crowds may be easily controlled as circumstances may demand.

The baggage-room, 10 × 39 ft., is on the left of the drop and forms a continuation of the exit passage. It is well lighted by skylights, being in the one-story annex to the main station. Between the baggage-room and drop is a boiler-room 11 × 39 ft., with brick-lined walls and floor, and lighted by skylights. It contains a steam-boiler 42 in. diam. by 14 ft. 6 in. for the steam heating of the entire building. Beyond are coal bins and a passage to a platform opposite the end of the ferry drop, where coal will be taken in or baggage handled direct from the boats.

The drop, built of wrought iron, occupies the central space of the annex and is 12 ft. wide by 56 ft. long. The hinge of the drop is at the end of a passage with sloping floor, which extends 21 ft. from the rear of the main station. This portion is roofed and lighted by three skylights.

The drop is raised and lowered by a hydraulic elevator, with 22-in. cylinder, made by Moore & Wyman. An apron of light iron framing, extending 5 ft. beyond the main framing of the drop, is designed to rest on the boat when in the slip, and is made light enough to break should any accident occur from collision with the boat without causing injury to the main drop or its hinges, which have a further provision of 2 ft. of clearance space as an additional precaution against any possibility of injury to the building from careless handling of boat or drop.

The first story under floor is laid with 2-in. spruce plank, tongued and grooved, all planed to a thickness on one side only. Upper floors on both stories are of first quality hard pine rift boards, not over 4 in. wide, laid with close joints, laid lengthwise of passages, with asbestos sheathing paper between floors.

On the second floor, besides a hall, is the Treasurer's general office, occupying the central portion, 18 ft. × 60 ft. To the left is a ticket room for ticket cases, 11 × 28 ft., the Treasurer's vault, 8 ft. square, also closets and lavatories. To the right is the Superintendent's general office, 21 × 48 ft., the Superintendent's record vault, *F*, 3 ft. × 12 ft. 9 in., the lost article storage room *S*, also a coat closet and lavatory. Both of the general offices are lighted with large skylights, and this method of lighting has been freely used wherever possible. In the rear, overlooking the ferry slip and harbor, are the Treasurer's private office, *G*, the President and Directors' room, *H*, with bay window in centre, both rooms making substantially one apartment, and the Superintendent's private office, *I*, each room about 15 × 16 ft., and the latter connecting with a library room, *K*, in rear projection. In front are two large office rooms, fronting upon Atlantic avenue, 21 × 29 ft. and 30 ft. 6 in. × 32 ft. respectively.

The station is plastered with adamant plaster, tinted and frescoed, the finish being ash. It is lighted by electric light and gas, contains fire-proof vaults, electric bells, speaking tubes, hot and cold water and steam heat. The ladies' waiting-room is luxuriously furnished in crimson plush. The gentlemen's waiting-room and hall are furnished with rattan seats. The cost of the entire station, including foundations and ferry slip, was over $60,000.

The Belpaire and the Radial Stay Boiler.

At present a lively interest exists in the discussion of the relative merits of the Belpaire and radial stay type of locomotive boiler. To illustrate exactly what is meant by a radial stay boiler and a Belpaire boiler, examples are given herewith.

In figs. 1, 2 and 3 is shown a new design of Belpaire boiler by the Pennsylvania road for the new class "P" engine. Its construction is easily seen from the drawings, which are clear and given with considerable detail. Explanation, however, may be necessary of the part shown in fig. 3, which is a steam conveyor to collect the wagon top at *A*, fig. 1, and deliver it into the dome at *B*. The end *A* is sub-divided into three separate passages, as shown in fig. 3. Here also is given a detail of the pipe and the method of supporting it.

This design of boiler probably is as satisfactory as any that could be selected for the prevailing practice in construction of the Belpaire type, and from it a clear understanding of what is meant by that type of locomotive boiler can be obtained.

The radial stay boiler has many different forms. The most prominent and best form yet constructed is that shown in figs. 4, 5 and 6, which was designed by the Baldwin Locomotive Works for the New York, Lake Erie & Western 10-wheelers, an illustration of which

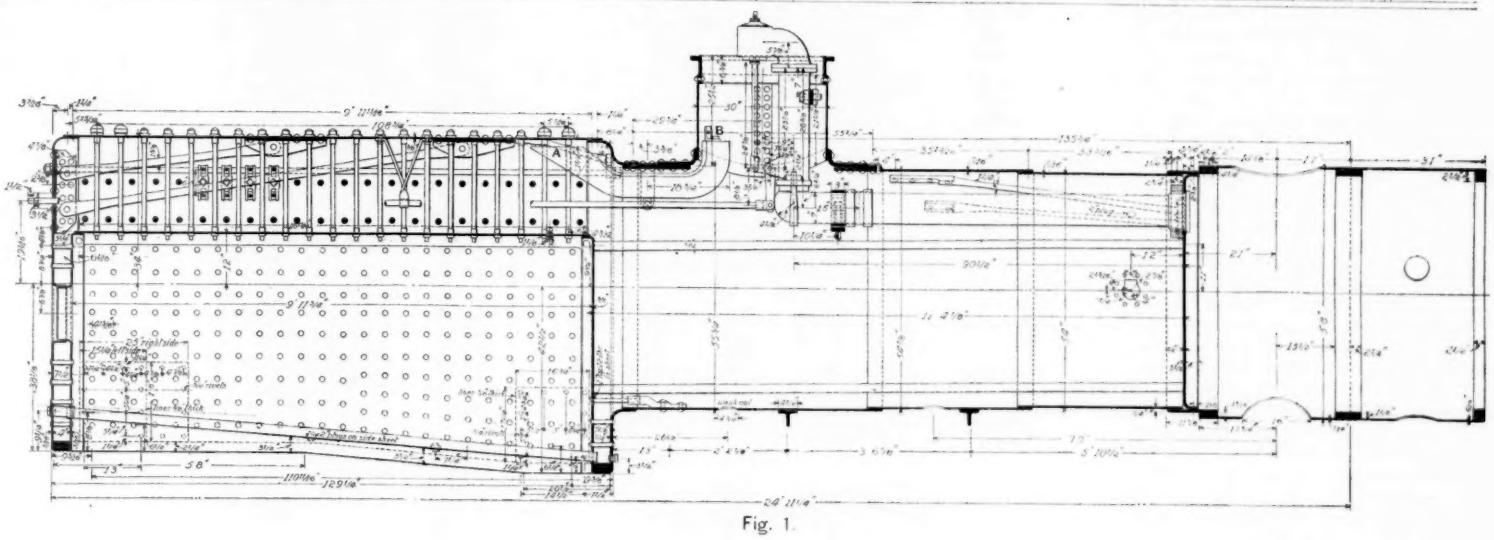


Fig. 1.

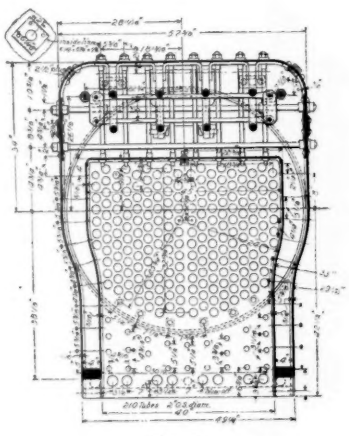


Fig. 2.

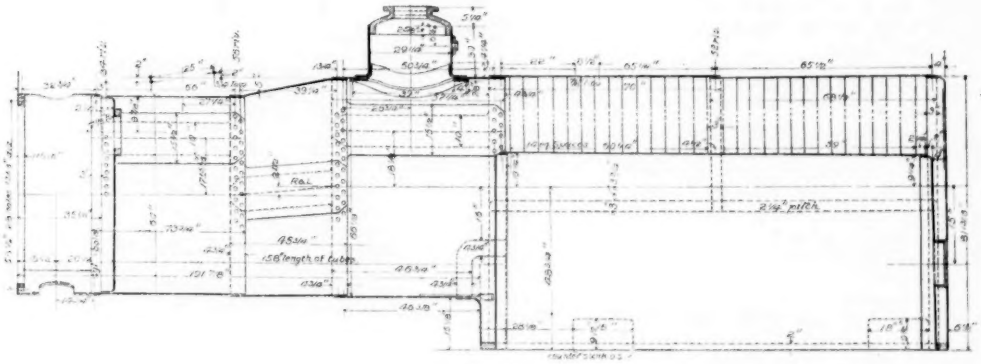


Fig. 4.

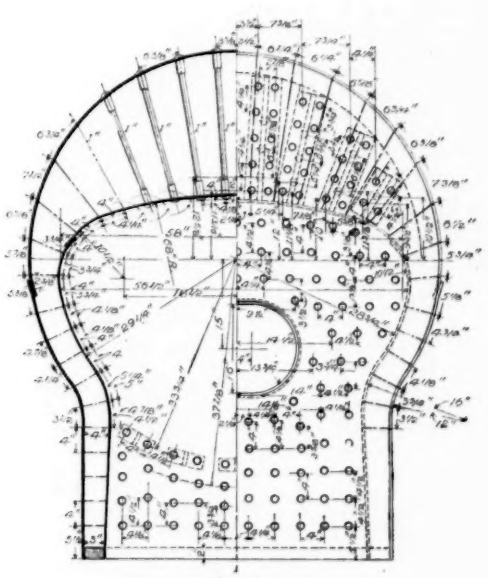


Fig. 5.

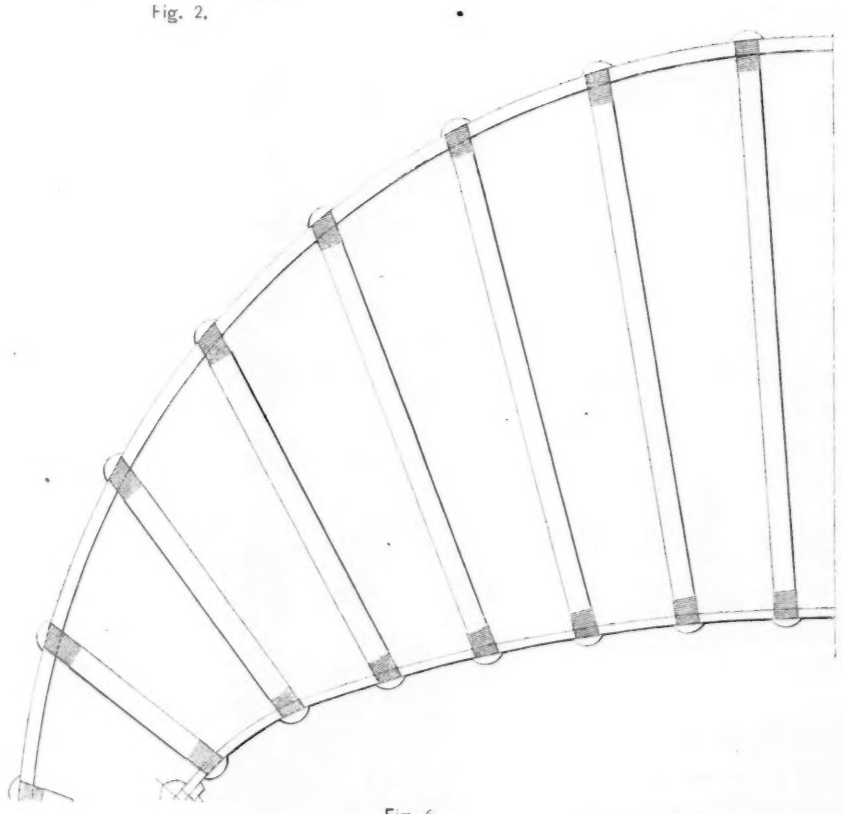


Fig. 6.

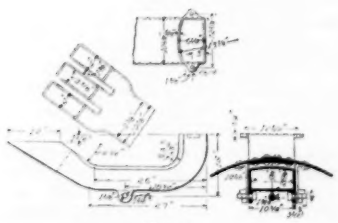


Fig. 3.

BELPAIRE AND RADIAL STAY BOILERS.

was given in the *Railroad Gazette* June 13, p. 413. The Baldwin Locomotive Works designed it to meet conflicting opinions of two railroad men on the same road, one of whom wanted the radial stay and the other the wagon top. Previous to that time the radial stay boilers had nearly all been made with the straight top with the dome placed on the waist. It will be observed that the dome in this design is on the wagon top, and yet radial stays are used. To accomplish this the wagon top has been extended one course and the dome placed thereon, the opening in the sheet being strengthened by the addition of a ring of steel 4 in. × ⅞ in., and by flanging up the shell into the dome, as shown. In addition to these features there are others in the detail of the construction which are worthy of mention; notably the longitudinal butt joints with lap welts and double-riveted roundabouts.

This design furnishes a good illustration of the radial stay wagon-top boiler. It is a new design now in successful use, and one which the Baldwin Locomotive Works are strongly recommending, particularly for those cases where bad water has to be contended with. Comment on the relative merits of these boilers will be found in the editorial columns.

Wooden Trestle Bridges.*

BY WOLCOTT C. FOSTER.

STANDARD TRESTLE PLANS, TOLEDO, ST. LOUIS & KANSAS CITY RAILROAD.

These cuts show the standard plans for trestle construction as adopted on the Toledo, St. Louis & Kansas City Railroad, of which road Mr. A. L. Mills is the Chief Engineer.

This style of trestle belongs to the same classes as those illustrated in the *Railroad Gazette* of June 13 and July 27, *i. e.*, compound member trestles and multiple story trestles with continuous posts. In detail, however, it varies in every particular, bearing not the slightest trace of similarity to those already described.

The guard rails are of 6-in. × 6-in. timber notched over the ties, and are placed about 3 in. from their ends. The ties are 6 in. × 8 in. × 9 ft. long. They are spaced 16 in. from centre to centre, thus leaving a clear space of 8 in. between any two ties. While this spacing is a very common one, it would make a much better floor were it reduced to 4 in., or at most to 6 in. It would also be an improvement to make the ties 12 ft. long and alter the stringers so as to have the track stringers composed of

*Copyright 1890, by W. C. Foster, and condensed from his forthcoming book on the same subject.

two or three pieces, as the case might require, with an outside or jack stringer to support the end of the ties. This would make a wider floor, and give a derailed train more chance to cross the bridge in safety.

The stringers, it will be seen, are composed of three pieces separated a distance of 4 in. by cast-iron spools or thimbles. They are of 7-in. × 18-in." timber and are only 18 ft. long, or just long enough to span a single bay.

The joints are exceptionally weak, being of very poor design indeed. The only connection between the stringers over one bay and those of the adjacent bays is a couple of wrought-iron plates 2 in. × 13 in. × $\frac{5}{16}$-in. placed under the heads of the packing bolts on the inside faces. These act as but little else than washers, except in so far as they prevent the stringers pulling apart in the direction of their length. Should a bent be washed out or greatly weakened, there would not be a ghost of a chance of a train being carried over. The separate pieces of each stringer are also held together at a point midway between their ends by a single bolt. Cast-iron spools are of course used at this point, as well as at the ends, as separators.

A very commendable arrangement to prevent the rapid spread of fire is the covering of the stringers with pieces of No. 27 sheet iron 30 in. wide. While this will not necessarily prevent the communication of a fire from the ties to the balance of the structure, still it will act as a considerable check, and may frequently prevent serious damage.

The stringers are not fastened to caps, but merely rest upon them of their own weight, being well notched down over them. They are, however, held in place by two blocks and a spreader of 3-in. × 12-in. plank fastened directly to the caps.

The caps, which are split, are made up of two 7-in. × 14-in. × 14-ft. pieces of timber, separated a distance of 7 in. by wooden blocks 6 in. thick, which act both as separators and as tenons to the posts, and which are packed on both sides by ½-in. washers. Each block is held by three $\frac{5}{8}$-in. bolts through both the cap and the corresponding post, thus making six bolts to a single block. The tops of the caps are covered with No. 27 sheet iron 24 in. wide in a similar manner to, and for the same purpose as, the stringers.

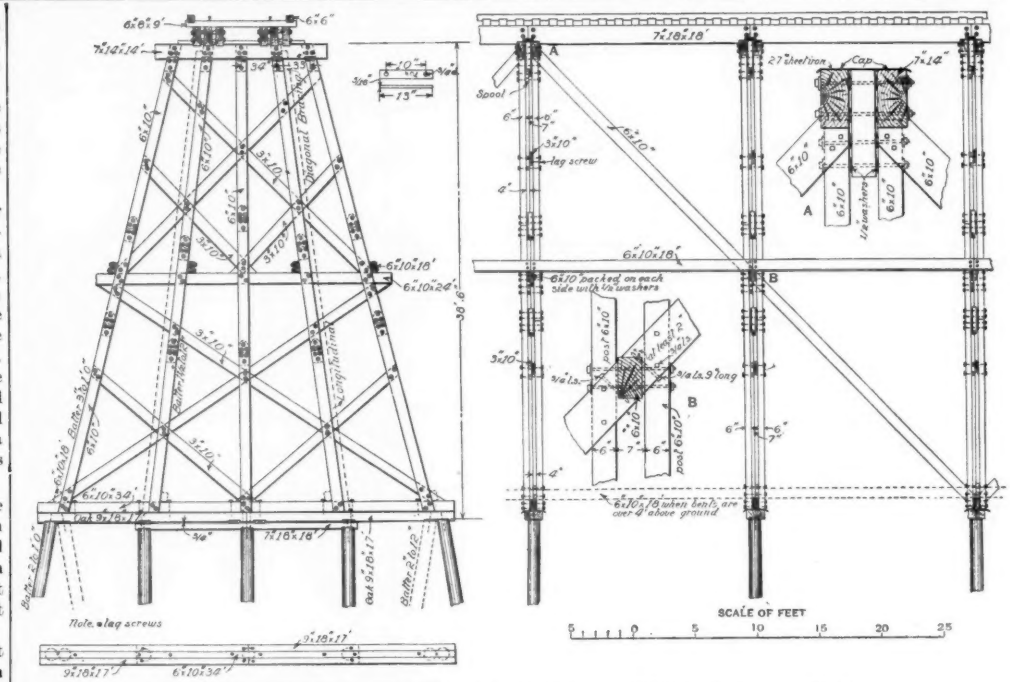
There are five posts, which are continuous throughout all the stories, instead of four, as is customary. They are each made up of two thicknesses of 6-in. × 10-in. timber bolted together with $\frac{5}{8}$-in. bolts, but separated 7 in. from each other. It will be noticed that the upper end of the splice blocks is rounded off. This is done so as to cause any water to drain off as rapidly as possible. These blocks are of 6-in. × 10-in. material, and are built up to the necessary thickness by placing ½-in. packing washers on each side of them. All the joints are, of course, broken. At every joint six $\frac{5}{8}$-in. bolts are used to keep the timbers together, three bolts being placed in the end of either of the butting pieces. It will be noticed that the posts are deeply notched into the cap in addition to being fastened to the separating blocks. The centre post is the only vertical one. Those immediately next to it on either side have a batter of 1½ in. per foot, while the outside posts have a batter of 3 in. per foot.

The horizontal sway bracing which separates the upper and lower stories from each other consists of but a single 6-in. × 10-in. stick clamped between the post pieces and held of each post by two $\frac{5}{8}$-in bolts. It is packed on both sides by ½-in. washers.

The construction of the main sill is very peculiar. It consists essentially of three different parts. The upper portion is a single 6-in. × 10-in. × 34-ft. stick clamped between the post pieces, bolted and packed in a manner similar to the horizontal sway bracing. This part of the sill and the ends of the posts rest upon the second portion of the complete sill, which consists of two 9-in. × 18-in. × 17-ft. timbers placed end to end and forming really a cap to the piling. These two parts are fastened together by eight $\frac{3}{4}$-in. × 14-in. lag screws. The second portion is of oak and is covered with sheet iron in a similar manner to the stringers and caps. Beneath this second part of the sill, and extending under the foot of the three inside posts, is a third piece of 7-in. × 18-in. × 18-ft. oak timber. The latter is separated from the second part by four blocks, which also act as keys, being notched into both upper and lower timbers. This third stick really forms a splice block for the two pieces of the second part of the sill. It also acts as a cap to the three inside piles. The second and third parts of the sill are fastened together by $\frac{3}{4}$-in. × 14-in. lag screws, and the sill as a whole is fastened to the piles by $\frac{3}{4}$-in. square × 20-in. drift bolts, one drift bolt to each pile.

The sway bracing, it will be noticed, is decidedly novel. It is entirely different to that of any of the structures previously described. There are two sets of braces to each story. Instead of being placed on the outside of the posts the braces are clamped between the post pieces. As it consists of but 3-in. × 10-in. plank there are spaces of 4 in. at some of the intersections. These spaces are filled up by cast-iron spools. At each intersection two $\frac{5}{8}$-in. bolts are placed, with the addition of a lag screw at some of them.

There are two sets of longitudinal braces; one horizontal, the other diagonal. The horizontal bracing consists of 6-in. × 10-in. × 18-ft. timbers placed on four of the posts at the bottom of the first or upper story and fastened on by $\frac{3}{4}$-in. lag screws. When the sills are over 4 ft. above the ground another set of horizontal braces is added at the bottom of the lower story as shown in the diagrams by the dotted lines.



STANDARD TRESTLE—TOLEDO. ST LOUIS & KANSAS CITY RAILROAD.

The diagonal longitudinal bracing is made of 6-in. × 10-in. timbers. The method of attaching it to the caps and other parts of the structure is shown in the enlarged detail drawings.

The foundation consists of one pile driven beneath the foot of each post. The three inner piles are vertical while the outside piles have a batter of 2 in. per foot. In the channels of streams or where the piles extend 12 ft. or more above the ground a pile is added on the inside of each outside pile and is driven with a batter of 2 in. per foot, but in the opposite direction to that of the outside pile. The position of these extra piles is shown in the elevation of the bent by dotted lines.

The bents are spaced 18 ft. from centre to centre.

Following is given a list of the dimensions of timber and iron work as used in this trestle:

BILL OF TIMBER FOR ONE BENT AND ONE BAY.

Name.	No. of pieces.	Size.	No. of Ft. B. M.
Floor System.			
Guard rails	2	6 in. × 6 in. × 18 ft.	108
Ties	14	6 in. × 8 in. × 9 ft.	504
Stringers	6	7 in. × 18 in. × 18 ft.	1,134
Spreader	1	3 in. × 12 in. × 3 ft.	9
Spreader blocks	2	3 in. × 12 in. × 15 in.	7.5
First or Upper Story:			
Cap	2	7 in. × 14 in. × 14 ft.	228
Posts (see end).			
Tenon blocks	5	6 in. × 10 in. × 2 ft. 2 in.	59
Splice blocks	5	6 in. × 10 in. × 2 ft.	50
Sway bracing (diagonal)	2	3 in. × 10 in. × 24 ft.	120
	2	3 in. × 10 in. × 14 ft.	70
Sway bracing (horizontal)	1	6 in. × 10 in. × 24 ft.	120
Second or Lower Story:			
Posts (see end).			
Splice blocks	5	6 in. × 10 in. × 2 ft.	50
Sway bracing (diagonal)	2	3 in. × 10 in. × 34 ft.	170
	2	3 in. × 10 in. × 18 ft.	90
Sill (upper part)	1	6 in. × 10 in. × 34 ft.	170
Sill (middle part), oak	2	9 in. × 18 in. × 17 ft.	459
Sill (lower part) oak	1	7 in. × 18 in. × 18 ft.	189
Key blocks	4	3 in. × 12 in. × 18 in.	18
Posts	10	6 in. × 10 in. × 24 ft.	1,200
	10	6 in. × 10 in. × 16 ft.	800
Longitudinal Bracing:			
Diagonal	2	6 in. × 10 in. × 28 ft.	280
Horizontal	4	6 in. × 10 in. × 18 ft.	360
When piles are over 4 ft. high add horizontal	4	6 in. × 10 in. × 18 ft.	360
Foundation:			

Five oak piles. Where piles are over 12 ft. out of the ground or in channels of streams, add two piles more. All piles at least 12 in. diam. at cut off.

BILL OF IRON FOR ONE BENT AND ONE BAY.

No.	Name.	Size.	Use.
8	Packing bolts	$\frac{5}{8}$ in. × 31 in.	Packing bolts for stringers
15	Bolts	$\frac{5}{8}$ in. × 23 in.	Cap pieces together.
143	Bolts	$\frac{5}{8}$ in. × 21 in.	Post splices, sway brace intersections, posts to tenon blocks, posts to sill.
54	Lag screws	$\frac{3}{4}$ in. × 9 in.	Sway braces to posts, longitudinal braces to posts, etc.; spreader and spreader blocks to cap.
16	Lag screws	$\frac{3}{4}$ in. × 14 in.	Sill pieces together.
5	Drift bolts	$\frac{3}{4}$ in. sq. × 20 in.	Sill to piles.
52	Packing spools	4 in. long.	
252	Packing washers	½ in. thick	For $\frac{5}{8}$-in. bolts.
316	O G washers		For $\frac{5}{8}$-in. bolts.
4	Wr't iron plates	13 in. × 2 in. × 5-16 in.	For connecting stringers.
...	Sheet iron No. 27	36 ft. × 30 in.	Covering stringers.
...	Sheet iron No. 27	14 ft. × 24 in.	Covering caps.
...	Sheet iron No. 27	34 ft. × (?)	Covering sill.

Also sheet iron to cover all places where fire can lodge.

When piles are over 4 ft. above the ground add
16 Lag screws..... $\frac{3}{4}$ in. × 9 in..... Longitudinal braces to posts.

When piles extend over 12 ft. out of the ground, and in channels of streams, add
2 Drift bolts..... $\frac{3}{4}$ in. sq. × 20 in..... Sill to piles.

The Railroads of the United States in 1889.

Poor's Manual for 1889 is just out, and some figures taken from the introduction follow. The growth of the system for the year is shown in the following:

Length of track laid up to Dec. 31, 1889	161,396.64 miles
Of which were completed up to the close of the fiscal years of the respective companies	160,544.24 "
Completed since close of their fiscal years	852.40 "
Increase of mileage in the calendar year 1889	5,751.01 "
Increase of mileage in the fiscal year 1889	6,268.43 "

"The tabulations herewith presented do not cover the same period as those given for the fiscal year 1888 in the Manual for 1889. This is the result of the adoption of the Interstate Commerce Commission's fiscal year by a large number of the leading railway systems of the country. The year covered by the statements of such companies overlaps for some months the statement of 1888; and, therefore, the following summary does not reflect the full extent of the improvement in railroad earnings that has taken place since the last number of the Manual was issued. The total amount of gross earnings reported by the steam surface railroads in operation in the United States in 1889 equaled $992,856,856. Adding to this the gross earnings of the elevated railroads in the cities of New York and Brooklyn, $10,879,740, the grand total reaches the sum of $1,003,736,596—a sum 50 per cent. greater than the public revenue of the United States and nearly equal to the United States public debt.

"In the following statement is given the mileage, gross and net earnings of all the railroads in the United States for the five years, 1884–1889:

	Road worked.	Gross earnings.	Net earnings.	Gross earnings per mile.	Net earnings per mile.
	Miles.				
1884	115,704	$777,396,317	$270,890,955	$6 663	$2,318
1885	123,320	772,568,883	269,493,931	6,265	2,185
1886	125,185	829,940,836	300,603,564	6,570	2,376
1887	137,028	940,150,702	334,989,119	6,861	2,444
1888	145,387	960,256,270	301,631,051	6,540	2,045
1889	152,745	1,003,736,596	322,284,986	6,574	2,117

"The net earnings from traffic operations show an increase of over $20,000, and this sum, with an increase of $4,000,000 in the miscellaneous receipts from investments, etc., of the companies was sufficient to warrant a slightly increased return upon the capital invested. The showing made in net earnings is particularly gratifying in view of the many causes which tended to an increased ratio of expenses. That the aggregate net earnings failed to reach the total of 1887, or that the average per mile of road was considerably lower than those of 1886 and 1887, does not mean that the railroads cannot be worked at as low a rate now as then. On the contrary, there is every evidence to show that, under reasonable conditions, the existing railroad system of the United States could be operated at an average of 60 per cent. of its gross earnings.

"Compared with 1888 gross earnings increased $43,480,326, to which increase the elevated railroads contributed $1,245,478, the remainder, $42,234,848, being the increase upon the surface roads, made up by increases of $8,284,640 in passenger earnings, $27,329,830 in freight earnings, and $6,620,378 in mail, express and other miscellaneous earnings. The most marked increases in earnings were in the states west of the Mississippi and east of the Rocky Mountains. In the Middle States the losses in gross earnings suffered by the coal carrying roads kept the increase for the section down to a narrow margin of $4,500,000, while the whole South fails to show any gain of consequence. In the latter case this failure to show expected results is due almost wholly to the inability of the vast number of new roads which have recently been brought into operation to report for a full year, as the date of their several openings in nearly every case antedated the close of their fiscal year only by a few months. In consequence the figures of actual traffic statistics

cover only the part of the year during which the several roads were operated in 1889."

The following compact table is a comparative statement showing the averages per mile of stock, bonds, cost, and earnings, percentage of expenses to earnings, earnings per passenger train mile and per freight train mile, per passenger mile and per ton mile, etc., for 1884, 1885, 1886, 1887, 1888 and 1889:

	1889.	1888.	1887.	1886.	1885	1884.
	$	$	$	$	$	$
Capital stock per mile of completed road	27,999	28,768	28,321	29,935	29,876	30,064
Bonded debt per mile of completed road	30,078	29,972	28,290	29,062	29,453	29,317
"Cost of road and equipment" p. M. of com. road	53,556	54,008	52,699	54,301	55,059	55,329
Passenger earnings per mile of road in operation	1,771	1,729	1,756	1,693	1,612	1,801
Freight earnings per mile of road in operation	4,365	4,397	4,649	4,397	4,219	4,382
Gross earnings per mile of road in operation	6,574	6,540	6,861	6,570	6,265	6,663
Net traffic earnings per mile of road in operation	2,117	2,045	2,444	2,376	2,185	2,318
Percentage of expenses to earnings	67.90	68.72	64.45	63.84	65.12	65.21
	$	$	$	$	$	$
Passenger earnings per passenger train mile	0.928	0.937	1.008	1.006	0.949	1.001
Freight earnings per freight train mile	1 547	1.557	1.615	1.573	1.518	1.502
Gross earnings per revenue train mile	1.372	1.380	1.445	1.443	1.361	1.410
Gross expenses per revenue train mile	0.933	0.948	0.931	0.921	0.892	0.918
Net earnings per revenue train mile	0.439	0.432	0.514	0.522	0.474	0.492
	per cent.	per cent	per cent.	per cent.	per cent.	per cent.
Passenger earnings—proportion of gross	26.95	26.44	25.82	25.77	26 9	27.1
Freight earnings—proportion of gross	66.40	67.24	68 38	66.94	67.4	65.9
Other earnings—proportion of gross	6.65	6.32	5.80	7.29	5.7	7.0
	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
Earnings per passenger per mile	2.170	2.246	2.276	2 181	2.198	2.356
Earnings per ton per mile	0.976	0.977	1.034	1.042	1 057	1.124
	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.
Average journey per passenger	24.17	24.78	24.68	25.27	25.99	26.24
Average haul per ton	110.80	110.72	111.51	109.49	112.46	112.07
	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
Interest per cent. of bonds	4.38	4.35	4.71	4.75	4.77	4.66
Interest per cent. of bonds and debt	4 20	4.17	4.55	4.53	4.62	4.51
Dividends per cent. of stock	1.77	1.77	2.18	2.04	2.02	2.48
Interest and dividends per cent. of stocks, bonds and debt	3.07	3.03	3.40	3.25	3.36	3.52

"The following statement shows the increase in share capital, funded and unfunded debts of the railroads during the past 5 years, 1885 to 1889:

Year.	Capital stock.	Stock increase.	Funded debt.	Funded debt, increase.	Unfunded debt.	Unfunded debt, increase.	Total increase.
1885	$3,817,697,832	$ 55,081,146	$3,765,727,066	$96,611,294	$259,108,281	$14,441,685	$166,134,125
1886	3,999,508,508	181,810,676	3,882,966,330	117,239,264	280,673,814	21,565,533	320,615,473
1887	4,191,562,029	192,053,521	4,186,943,116	303,976,786	294,682,071	14,008,257	510,038,564
1888	4,438,411,342	246,849,313	4,624,035,023	437,091,907	306,952,589	12,270,518	696,211,738
1889	4,495,099,318	56,687,976	4,828,365,771	204,330,748	357,477,169	50,524,571	311,543,295
Total		$732,482,632		$1,159,249,999		$112,810,564	$2,004,543,195

"In the five years ending with 1889 railroad mileage increased 36,244 miles, or 29.8 per cent. Capital investment increased $2,004,543,195, or 26.1 per cent. This increase in investment consisted of an increase of 19.5 per cent. in capital stock, 31.6 per cent. in funded debt, and 46.1 per cent. in other forms of indebtedness.

"The following statement will show the volume of freight traffic on all the railroads of the United States during the eight years, 1882-1889:

Years.	Tons freight moved.	Tons freight moved one mile.	Aver. rate per ton per mile.	Aver. haul per ton.
	Tons.	Miles.	Cents.	Miles.
1882	360,490,375	39,302,209,249	1 236	109.02
1883	400,453,439	44,061,913,445	1.236	110.04
1884	399,074,749	44,725,207,677	1.124	112.07
1885	437,040,099	49,151,891,469	1.057	112.46
1886	482,245,259	52,802,070,529	1.042	109.49
1887	552,074,752	61,561,069,996	1.034	111.51
1888	590,857 353	65,423,005,988	0.977	110.72
1889	619,137,237	68,604,012,396	0.976	110.80

"It will be observed that the downward tendency of freight rates is as yet unchecked. When the Manual first, in 1882, began the comprehensive tabulations of railroad statistics which have since become such an important feature of its introductory articles, it was shown that the total tonnage mileage of all the railroads equaled, in 1882, 39,302,209,249, and that the average rate of transportation per ton per mile was 1.236 cents. From that time to the present, the decline has been steady, until in 1888 it sank below the rate of one cent per ton per mile. In the seven years from 1883 to 1889, inclusive, the tonnage mileage of the railroads of the United States has been 386,332,184,500. Had the rates of transportation that prevailed in 1882, viz., 1.236 cents per ton per mile, been maintained during all this time, the earnings of the railroads of the country from freight transportation for the seven years would have reached $4,775,065,800, instead of the amount actually received, $4,041,269,441, a difference in favor of the railroads of nearly $734,000,000.

"In the following statement the statistics of passengers carried, passenger mileage, average distance each passenger, and average rates received per passenger per mile on all the railroads of the United States, are shown for the eight years from 1882 to 1889, inclusive:

Year.	Passengers carried.	Passenger movement.	Average distance per passenger.	Average rate per passenger per mile.
	No.	Miles.	Miles.	Cents.
1882	289,030,783	7,483,059,934	25.89	2.514
1883	312,686,641	8,541,309,674	27.32	2.422
1884	334,570,766	8,778,581,061	26.24	2.356
1885	351,427,688	9,133,673,956	25.99	2.198
1886	382,284,972	9,659,698,294	25.27	2.181
1887	428,225,513	10,570,306,710	24.68	2.276
1888	451,353,655	11,190,613,679	24.78	2.246
1889	495,124,767	11,965,726,015	24.17	2.170

"In 1882 the average number of passengers carried per mile of railroad in operation was 3,018.5. In 1886 this average had increased to 3,054.7, and in 1889 it was further increased to 3,242.6. In the latter year the number of passengers carried was 71.2 per cent. greater than the number carried in 1882. These figures will show the large and constantly increasing growth of the passenger transportation business of the railroads of this country. But while this branch of their business is increasing with encouraging strides, the service rendered to the public and the accommodations provided for it by the railroads has been increased in even greater ratio. In other words, the facilities of railroad passenger transportation have been increased in a degree far out of proportion to the increase in passenger traffic. This is clearly proven by an examination of the statistics of passenger transportation presented in the Manual from year to year. In 1882 the passenger movement, of all the railroads in the United States, which means the total number of miles traveled by all passengers, bore the relation to passenger train mileage of 45.2 miles to 1 mile, while in 1889 the relative proportion was 42.8 miles to 1 mile, a decrease within that period of 2.4 passenger miles to each passenger train mile."

A Plea for Rigid Frogs.

TO THE EDITOR OF THE RAILROAD GAZETTE:

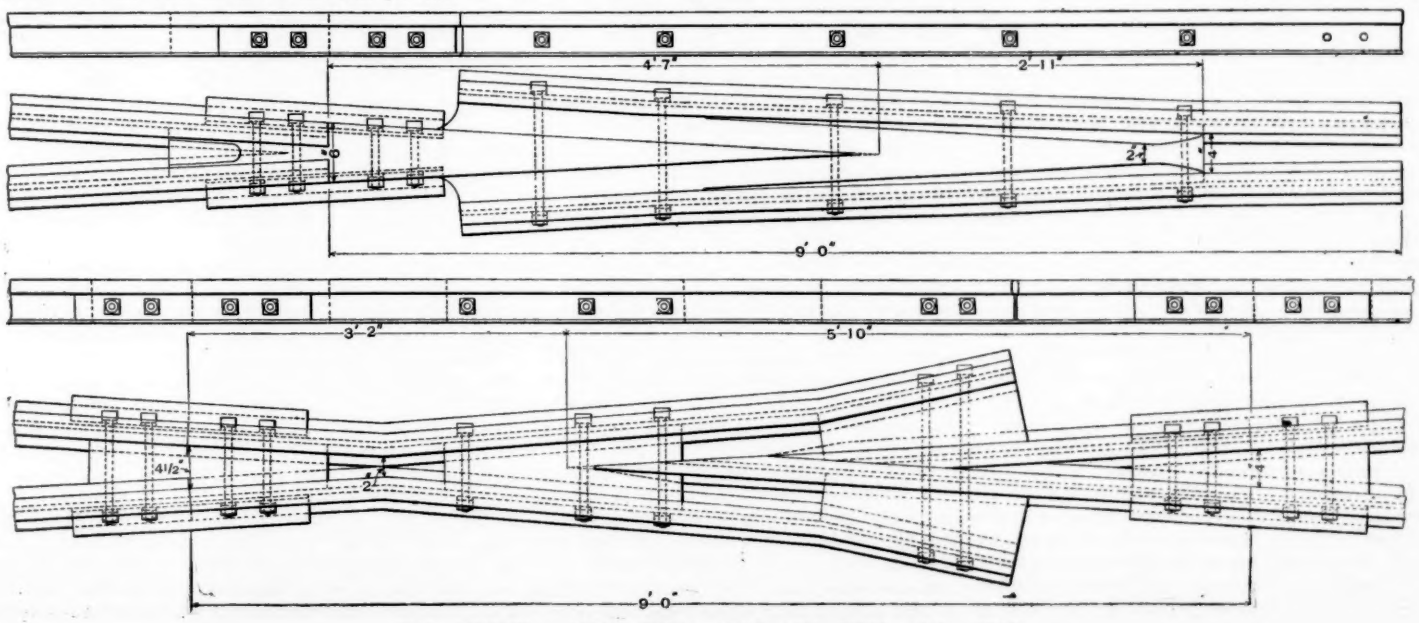
Hoping that you will devote some space to the further discussion of the important question of frogs, I send a few remarks in answer to recent articles in the *Railroad Gazette* concerning the rigid and spring frog. Those articles were inspired by the fact that the Pennsylvania Railroad has been replacing the spring rail frog by the rigid frog.

I am of the opinion that the spring rail frog used by the Pennsylvania system was as good as any in the tracks of other roads, but I will say that I consider all frogs of this description positively unsafe and dangerous in addition to requiring the most careful attention continuously. A Pennsylvania engineer says that while the spring rail frog rode nicely and was durable, yet the recurring accidents caused by its use proved that the great element of danger necessitated, without question, an immediate and permanent change. The cause of trouble was in the breaking or rolling out of the loose rail, which is the principal of the many objections to this appliance. This has been charged to imperfect wheels, sharp flanges and rigidity of the roadbed in winter; but careful observers know that the fault absolutely lies in that style of frog, and for the sake of safety overlook some of its unquestionably good points and urge its abandonment.

Presuming, therefore, that experienced railroad men prefer the rigid frog, the question arises as to which of all the styles of rigid frogs manufactured is the best in the points of safety, durability and service. I send you a blue print of what I think is the best frog in the market. My frog is, as its name implies, a solid steel frog, connected to the heel as in any rail frog, and at the toe by wing rails attached. While there are a number of railroad men who will insist that the use of a solid rigid frog is very injurious to rolling stock, yet I claim if a frog is so manufactured as to perfectly fit the flange and tread of the wheel, and if I can have railroad officers dispense with the long, rigid, heavily braced guard rail and use the short, well-curved guard rail or spring guard, the nearest point to the main rail of which should be 4 in. ahead of the tongue of the frog, then I have a perfect frog and have thoroughly guarded the only point needing protection. In the use of the long, rigid guard rail we find that the wheel soon cuts the guard rail and wears off the angle at the throat of the frog until the wheel eventually has a passage exclusively its own, and the resulting damage to rolling stock, such as broken flanges, loosened wheels and twisted axles, is well known.

When my frog is placed in position, properly surfaced and lined, and the bolts tightened, it does not need 'proper attention to details," but will require no looking after until the ties beneath it become rotten. It complies with the laws of Ohio and other states, because in itself it is a positive footguard for anything that walks, thereby doing away with wooden blocks and cinder filling and with the eight boot-jacks of the ordinary frog and rides as smoothly as any part of the track. It is self-cleaning in all seasons, and guaranteed to outwear six rigid rail frogs. I hope that the statement of these salient points will lead to an inspection, which I especially solicit.

G. R. CAMPBELL,
Road Master Toledo & Ohio Central Railway.



THE CAMPBELL SOLID STEEL FROG AND STEEL RAIL FROG.

RAILROAD GAZETTE

Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

In another column will be found interesting data taken from a mogul express locomotive bearing on the matter of flat spots on driving tires, developed in service. These flat spots have been attributed to the action of the counterbalance, to the angularity of the connecting rod, and to the variation in the turning moments of the cranks. Whether they are due to only one, to several, or to all of these causes, there seems to be no easy way of determining; but in this case, with a mogul express locomotive, there was a decided change in the line representing the wear of the tire after the counterbalances were changed. When the tires were turned for the first time, it will be noticed that as much as $\frac{23}{64}$ of an inch of good steel tire had to be removed in order to take out the flat spots. In this case the tires were originally 3 in. thick. That portion of the thickness which is available for useful wear is about $1\frac{1}{4}$ in., provided the tires are thrown away when they are reduced to $1\frac{1}{4}$ in. To waste $\frac{23}{64}$ out of a useful thickness of $1\frac{1}{4}$ in. is equivalent to a loss of about 29 per cent. of the total wearing value of the tire; and an indisputable fact regarding this particular case is that if the flat spots could be avoided the wearing material would be $\frac{50}{64}$ instead of $\frac{27}{64}$, and, therefore, the tire would wear 40 per cent. longer, and further than this, if the limit to the time of service before taking the engine into the shop was found in the life of the tire, as it is in many cases, then the engine could be kept out considerably longer. We expect soon to give diagrams illustrating some features of the conditions which might bring about this unequal wear. Meantime, we should be glad to hear from those who have information or theories on the subject.

The Staff System.

A block system which requires no outdoor signals, which is adaptable without change to either single or double track and which is worked by means of apparatus that provides perfectly against errors of attendants, should be of interest to many American railroad officers, and we call their attention to a machine devised for this purpose (Webb & Thompson's train staff apparatus), illustrated on another page of this paper. The New York, New Haven & Hartford has, as our readers know, introduced the staff system on a seven-mile section of its road, but this company, as we understand it, uses the simple staff and ticket system, no electrical connection between the staff receptacles being employed. This road's action is doubtless in the nature of an experiment, however, and it may be that further improvements are contemplated.

As was said in our article on Webb and Thompson's device in the issue of Nov. 1, 1889, and indeed as is evident on comparison of the two systems, the electrical improvement adds immensely to the value of the staff system, making in fact a radical change in it. The most obvious defects in the improved system are the absence of any arrangement for delivering the staff to engineers passing a station at high speed, and the lack of any safeguard to prevent the delivery of a staff by an engineer to the station master (on the arrival at the end of the section) without first making sure that the whole of his train has arrived. With the ordinary block system the well known rule is to report a block section as clear only after the last car in the train, with the tail signal, is actually seen, and this is an important condition. The tablet system, which is considerably used in England, and which is similar in principle to the staff, has been employed for a number of years in connection with safeguards which provide against both rear and butting collisions in the same general way as does Webb and Thompson's device; and an apparatus has been devised by which the tablets, which are rectangular pieces of metal, can be exchanged without even slackening the speed of the train. By a simple device, similar in principle to that used here for mail bags, an engineer can take up a tablet while moving at high speed, while at the same time he drops the tablet which he has to leave with equal ease and precision. There would seem to be no insurmountable obstacle to making a similar arrangement for a staff.

The contingency of trains breaking in two is also one which it is not impossible to guard against. The staff might be divided into two parts, one of which should be carried in the caboose; or it could be made hollow, with a piece inside which could be used by the rear brakeman as a check upon the engineer. It is a question, however, whether any such mechanical means would be any more serviceable or safer than would the usual arrangement requiring the person in charge of the station to see that no second train is permitted to enter a section until he is satisfied that the whole of the first has passed out. The Webb and Thompson apparatus can apparently be worked by trainmen in the absence of a station operator, though we presume that this is never done. If the system were to be used in America, however, this question would naturally come up, there being so many meeting places where operators are not employed.

It will be remembered that the British Board of Trade has issued a circular requiring all railroads to adopt the block system by November, 1890. The only exceptions that will be made to the rule will be (1) where a short piece of road is worked wholly by one engine and (2) single track lines worked on the train staff system *without tickets*. This would seem to afford a large field for the device which we to-day illustrate, as there are over 8,000 miles of single track road used for passenger traffic in the United Kingdom.

The Railroads of the United States in 1889.

The yearly appearance of Poor's Manual is an event of importance to all students of the growth and operations and the condition of the vast railroad system of the United States. The Manual for 1890, giving results for the companies' fiscal years ending in 1889, is now published. Extracts from the introduction appear on another page, and the reader will there see what the editor of the Manual says of the change in the fiscal years to conform to the request of the Commission.

The Manual gives the length of main-line track, Dec. 31, 1889, as 161,396.64 miles. The increase in the calendar year was 5,751 miles. The new mileage reported by the *Railroad Gazette* was 5,300; other journals reported 5,230 and 4,970. If the Manual was correct, and it ought to be, we must conclude that the *Railroad Gazette's* report was about eight per cent. below the truth. The *net* increase is given as 5,193 miles, deducting abandoned lines, etc. The increase in mileage for the last ten years (1880-1889) has averaged about 7,500 miles, according to Poor's figures; so for 1889 it was about 30 per cent. below the average. The new railroad built each year, for eleven years preceding and including 1888, a period covering two great waves of activity and depression, was 6.4 per cent. of the railroad existing at the beginning of that year. This is the average percentage. At that rate there should have been built in 1889 about 10,000 miles. In October, 1888, we published a careful speculative study by Mr. W. Howard White, in which he concluded that for the five years, 1885 to 1890, we should build from 8,000 to 8,700 miles per annum. In 1886, 1887 and 1888 27,800 miles were added to existing mileage, leaving, say, 13,500 miles for 1889 and 1890. However we look at it, the railroad building has for a long time been considably below the normal rate of increase.

We shall attempt no analysis of the complex reasons why this is so. On one hand, it may be said that hostile legislation and rate wars have destroyed confidence in this form of investment. Unquestionably this is to a great degree true. On the other hand, it may be said that the country has now about as much railroad as its present population can support, and that henceforth the railroad system must increase very slowly. This view of the situation has much to support it. Many of our readers will have noticed the figures published in our issue of July 18, giving population and area per mile of railroad here and in Europe. There it was shown that in the United States the population per mile is 423 and in all Europe it is 2,635. In no European country does the ratio fall below 1,015 persons per mile of railroad Again, in the United States, including Alaska, we had in 1888 one mile of railroad to 23.7 square miles of territory, and in Europe there was one mile to 28.8 square miles. As was pointed out in that article, there are special reasons why our supply of railroads can be and must be greater than in almost any other part of the world, but railroads are not built here for political, military or philanthropic reasons, and if they are to be built there must be a fair chance that they will pay. According to Poor's Manual, the total payments of the railroads of the United States, on all their liabilities, amounted in 1888 to 3.03 per cent.; in 1889, 3.07 per cent.; and according to the Interstate Commerce Commission they were in 1887-8 3.06 per cent. Such results have led investors to scrutinize with more and more care the railroad projects that are brought to them, and make it more difficult from year to year to raise money for new roads. It is no longer possible for a man with nothing but a charter in his pocket to go into Wall Street and "finance" his scheme.

The traffic statistics of 1889 are favorable, notwithstanding continued low rates, both passenger and freight. Below is given the volume of business in the last five years and also in 1882, that comparison may be made through a period during which the conditions may be considered as normal. The passenger miles and ton miles are in *millions:*

	1882.	1885.	1886.	1887.	1888.	1889.
Miles operated	104,971	123,320	125,185	137,028	145,387	152,745
Pass. miles	7,483.1	9,134	9,660	10,570.3	11,190.6	11,965.7
Ton miles	39,302.2	49,152	52,802	61,561	65,423	68,604
Increase per cent. per year:						
Miles operated		1.5	9.4	6.1	4.9	
Pass. miles		5.7	9.3	5.9	6.9	
Ton miles		7 4	16.6	6.3	4.9	

The increase in traffic has kept close to the increase in mileage. The traffic *per mile of road* has been as follows, the passenger miles and ton miles being given to the nearest thousand:

	1882.	1885.	1886.	1887.	1888.	1889.
Pass. miles	71,000	75,000	77,000	77,000	77,000	78,000
Ton miles	375,000	398,000	422,000	449,000	450,000	449,000

From this it appears that the density of the traffic, both in freight and passenger movement, is slowly but pretty steadily increasing. The average passenger journey and freight haul are given below, as well as the rates received.

	1882. Miles.	1885. Miles.	1886. Miles.	1887. Miles.	1888. Miles.	1889. Miles.
Passenger journey	25.89	25.99	25 27	24.68	24.78	24.17
Freight haul	109.02	112.46	109.49	111.51	110.72	110.80
Cents per pass. per mile	2.513	2.198	2.181	2.276	2.246	2.170
Cents per ton per mile	1.236	1.057	1.042	1.063	0.977	0.976

While rates are slowly decreasing, the length of freight haul fluctuates little and the average passenger journey is undoubtedly growing shorter. This must be more marked with the growth of cities and the increase of local business. The passenger earnings per train-mile were less than in any recent year also, but still the increase in the volume of this traffic was such that the passenger earnings per mile operated were greater in 1889 than in any year since 1884. These facts appear in a table printed elsewhere. In that table will be found also the gross and net earnings per mile of road from all traffic, and it will be seen that while both are greater than in 1888, the net are less than in any other recent year.

It will be seen also that the percentage of expenses to earnings was 67.90, against 68.72 for 1888, and against an average of 65.17 for the six years 1882-1887. If the sudden increase in this ratio in the last two years really represented an increase in cost of operation, the outlook would be discouraging. On general principles we must suppose that improvements in roadbed, machinery and organization have steadily reduced the cost of operation. In individual instances we know that they have done so. On the other hand, there has been no general increase in wages, or in cost of fuel, machinery or other material to account for increased operating expenses. In Poor's Manual the increased ratio is attributed (1) to the floods of 1889, (2) to the excessive cost of working the new mileage brought into operation in 1889, and the editor assumes that the railroads of the United States could be operated for 60 per cent. of their gross earnings. The explanation seems rather inadequate, as (1) the floods of 1889 did not affect the operating expenses of 1888, when they were 68.72 per cent. of the gross earnings, and (2) new road has been first brought into operation in every year of the six in which the average was 64.33 per cent. The basis of the assumption that the roads could be operat-

ed for 60 per cent. may be better than this explanation, but it is not apparent. As a matter of fact there are a good many other reasons than those which Poor gives for the apparent increase in operating expenses. The fall in rates makes a great difference to begin with. A great deal more work had to be done to earn $1,000 when freight was carried at 0.976 cent per ton-mile than when it was carried at 1.124 cents. Again, we believe the railroads have lately charged more to operating expenses than in times past. That seems to be the tendency of the best roads. Large betterments both of road and of equipment have been made the last two years that have been charged to operating expenses. The result will appear later in a reduction of operating expenses, but we fear that it will be a long time before they can safely and honestly be brought down to 60 per cent. of the gross earnings.

Economy and "Time Out."

It may be that too much stress is laid on the mileage made by locomotives before they are sent into the shop. It is evident that there is a limit to the advantages of long mileage before repairs. That limit is to be found in the increased cost of the more durable details which assist in making this increased mileage, and in the loss of economy in the action of the engine, as all of the parts deteriorate in condition. The most economical period of a locomotive's existence is just after being put into service for the first time, when the bearings and all parts have got into working order. Every hundred miles after that the locomotive becomes less economical; the valves and pistons leak, the boiler sheets become covered with scale, and, perhaps, the working parts are more or less out of true, causing increased friction. This deterioration continues until there comes a time when the engine may be decidedly uneconomical, and yet in what is ordinarily termed a fit condition to run so far as the mechanical details are concerned. Now, the loss brought about by lack of economy in operation may more than offset any possible gain due to an increased mileage before requiring general repairs, and the limit may be reached before the mileage is what is generally called large; therefore it by no means follows that because a locomotive makes a large mileage it is an economical engine. The limit of the mileage before repairs should be found in the economy of operation, as well as in the condition of the more easily observed of the mechanical details. A vital part in bad order with respect to economy should determine or limit the "time out" as well and quite as decidedly as badly worn crank pins or tires. On a basis of cost of repairs alone, it is doubtful if it can be shown that locomotives which run a greater number of miles before a general overhauling are always less expensive in the end. What is aimed at is, of course, the least total cost of repairs per mile run, consideration being given to the amount of actual work performed.

Possibly repairs per ton mile might be on a somewhat more satisfactory basis than the cost of repairs per locomotive mile. It is possible to run a locomotive an enormous number of miles without taking it into the shop for general repairs. This has been shown on several American roads, and on the London and Northwestern in England, particularly; but when this large mileage is obtained by straining every point to keep the engine in service and by making expensive repairs in the roundhouses, and by giving the engine an extraordinary amount of attention, it is doubtful if, in the end, the result is a real saving. Possibly, if the true cost of repairs and operation of such engines were obtained, the cost per locomotive mile, or per ton mile, for all expenses would be greater than for some engines which are in the shop more frequently, and therefore are in a better average condition at all times when working. It may be that, instead of devoting so much attention to increasing the mileage between repairs, and the time out of the shop, it would pay better to estimate carefully the total cost of repairs in case all engines received as much attention as the special engines which have enormous mileage, and compare this with the cost of the engines which receive ordinarily good treatment. It might then be found that it will be cheaper in the end to have exceptionally good facilities for making repairs quickly and thus be enabled to maintain the engines in a good average condition rather than to allow them to run for a long time in an ordinary condition and, perhaps, in this way lose more than the interest on the cost of a plant which would furnish quick repairs.

The Belpaire and the Radial Stay Boiler.

In another column will be found illustrations of representative examples of the Belpaire and of the radial-stay, wagon-top boilers. In discussing the two constructions it may be well to say at the start that no objection is made to the staying of the Belpaire type of boiler. All the stays pass through the sheets at right angles, and they can be secured either with nuts or without, as may be desired, without the least difficulty. The objections offered to that type are principally to the crowded steam space and unsatisfactory situation of the steam dome.

The objections to the radial-stay, wagon top which have been so far brought out are principally with regard to the angularity of the screw stays in the sheets. Some authorities think that this type of boiler is satisfactory up to 145 pounds pressure, but above that they prefer straight stays with the full thread in the sheets, as in the Belpaire. Others favor the radial stays, but give more rise to the centre of the crown sheet than is shown in the design illustrated, and would prefer to move a few of the flues, if necessary, to get greater curvature to the crown sheet. Other objections which have been raised are that it is impossible to get nuts on the bottom of the crown stays below the sheets, such nuts being deemed necessary to hold the sheet in proper place at all times and under all conditions. It has been claimed that only one full continuous thread is had in the sheets in each of the holes through which pass the stays at the corner of the box, and because of the angularity of the stays to the sheet the "holder on" will be compelled to place his holder at an angle with the axis of the stays, thus causing a tendency to crowd them to one side. Also after the first few strokes the hammers of the riveters will be directed at an angle with the axis of the stays, and instead of upsetting will crowd them in a direction which would make the hole oblong. The tapping of the holes in fitting the stays, and also in screwing them in, are operations which are attended with difficulties where the stays are in angle with the sheet. So far, these are the main objections offered to this type of boiler.

With regard to the steam capacity of the Belpaire boiler, it is evident that actual results from service showing the steam to be either wet or dry would be much more satisfactory than any kind of discussion could possibly be, but as evidence of that sort has never been collected, it may be well to point out in a general way from what such difficulties are supposed to arise. It will be noticed, in the Belpaire boiler illustrated, that the dome is not on the wagon top, and that, in order to insure dry steam, a steam conduit is used to connect the dome with the steam space in the wagon top. From the nature of the design it is next to impossible to put a dome on a Belpaire fire box without using some very unsatisfactory bracing, particularly for the crown sheet. In nearly every instance where this has been done it has required the use of more or less crown bars, but the fundamental object of this design is to obviate any necessity for the use of such bars. It is, we think, true that the steam used in a majority of locomotive cylinders is wet because of the natural agitation of the water due to the motion of the locomotive, and further because in many cases the steam space is wholly insufficient. The cubic contents of the steam space in proportion to the amount of steam used per minute varies over 200 per cent. in different makes of locomotives, a variation which is entirely too great. If the smaller steam spaces are sufficient, then the boilers having larger spaces are unnecessarily large; and if the larger ones are yet insufficient to enable dry steam to be obtained, then those boilers which have smaller steam spaces must be uneconomical.

It is a question whether the steam conduit shown in fig. 1 will fulfill the purposes for which it is designed; that is, will conduct dry steam from the wagon top to the dome. The objection to having the steam pass into the dome through the space between the inside of the shell and the water is that it may collect water in transit and would be liable to be extremely wet, particularly as the larger amount of steam is generated over the fire box, and would be compelled to take this path in its course to the throttle. It is evident that steam, like all other fluids, will take the easiest path between the initial point and the terminal point. If the resistance is less in passing through the conduit pipe than through the larger space around that pipe, then the greater proportion will go through the conduit, the amounts passing through either being inversely proportional to the resistance offered. It might well be argued that unless the space around the conduit pipe was considerably reduced, so that the resistance in that space was greater than through the pipe, the larger volume of the steam would go around the pipe rather than through it. If the resistance in the two spaces was equal, then one-half of the steam would pass through either.

The essential objection to the radial-stay wagon top, and the one hardest to meet, is with reference to the angularity of the stays to the sheets. In order to illustrate exactly what these angles are, and the conditions which exist with this class of staying, we have given, fig. 6, on an enlarged scale a drawing of a section of the fire box with the stays in position, showing the threads, the thickness of the sheets and the angles of the stays. The angularity of the six centre rows is not very great, and, where it has been required by specification, these stays have had nuts on the bottom side of the crown sheet, and they are placed thereon without difficulty. On the remaining four rows on each side in the crown the use of nuts is next to impossible.

It is stated that the object of the nut is to prevent the crown sheet from pulling down so quickly after it becomes heated. Stays without nuts readily pull through the sheets while the sheets are still strong enough to hold a load if the stays did not give way, and it has been decided on several railroads, after experiments with heated sheets, that nuts must be used on the under side of crown stays where the crown is liable to be exposed by negligence of the firemen. It is argued that the four side rows of stay-bolts in the radial-stay, wagon-top design are considerably under the water line owing to the curvature of the crown, and that therefore these bolts do not require nuts at all. It is evident that the argument has some truth in it and that the need for nuts under the crown at that point is not so great as for the centre rows.

With regard to the number of full threads in the sheet for the stays with the greatest angle to the sheet, it will be noticed that the least number of threads is found in the case of the sixth row from the centre, where three full threads will be found in the outside sheet and two full threads in the inside sheet. In the case of the smaller boilers of this type, such as are used on many Forneys, switchers, and elevated railroad locomotives, no difficulty has been found in keeping the stays tight when only one full thread was obtained in either sheet; and in the Erie boilers and a large number of this type used on the Denver & Rio Grande, these particular bolts have remained tight from the start. There is another experience which is not generally known, but which bears on this point. It was with a considerable number of boilers that were made some time since where all of the stays were made horizontal for the sides of ordinary wagon-top boilers. The horizontal position was maintained even for those stays which pass through the curved portion of the water leg where the wagon top joins the fire-box leg. This caused these stays to be at an acute angle to the sheets, giving only one full thread in either sheet. No difficulty was experienced from leakage, but the usual number of breakages occurred, as is customary with the stay bolts at the sides of fire boxes. There probably need be no fear of leakage of stays, as the experience thus far obtained points decidedly toward comparative tightness.

In riveting over the ends of the stays, it is, of course, desirable that the head of the stay should be as nearly as possible distributed equally on both sides of the axis of the stay bolt, and at the same time cover the hole in the sheet uniformly all around. It is also necessary that the heads of the stay bolts should be as large as it is economical to make them, and yet not interfere with the tightness of the bolt in the sheet. There are two conflicting conditions. A small head permits the upsetting of the stay bolt within the sheet, rendering it absolutely tight beyond question: with a large head the force of the blow is expended upon the end of the bolt rather than on that portion of the bolt within the sheet, and less expansion in the hole is obtained, lessening the security against leakage. A large head is necessary where the maximum strength of the stay bolt in the sheet is desired. It was found some years since from experiments made by the United States Government that the resistance of stay bolts in pulling through a sheet was, within ordinary limits, somewhat in proportion to the size of the head. The larger the head, the greater the resistance to the pulling through the sheet. However, it is but just to say that there is no proof that a stay bolt cannot be made absolutely tight, even when a large head is riveted on the end, and also it is not necessary that a large head be used to increase the strength when the stay bolts are sufficiently large in diameter. If stays were put in with large ends on reduced centres, as it would seem they should be for radial stay wagon-top boilers, or were made of very large iron throughout, there could be no question as to the holding power with ordinary riveting on the ends, except it may be on the under side of the crown, for the eight centre rows when the crown is heated. Surely the

fifth row from the centre is sufficiently well covered with water to obviate any necessity for nuts or extremely large heads at that point. It is below the top of the top row of tubes and about on a line with the top row of stay bolts in ordinary boilers.

With respect to the riveting on the ends of the bolts where they are at an angle with the sheet, there might be some difficulty on the outside end of the sixth and seventh rows, but surely not with the others, and it is easy to conceive of a plan of riveting which would make a satisfactory job of the outer end, even of the sixth and seventh rows; but care must be exercised to prevent the driving, laterally, of the bolt in the sheet, otherwise there might be danger of leakage by the enlargement of the hole. In order to prevent any difficulty from the angularity of the bolts, or with the number of threads in the sheets, the outer shell of the design in question is made one-eighth of an inch thicker than is necessary to resist the internal pressure. and in this way objections to inherit weakness are largely removed. The angle of the bolts with the inside sheets is not as great in this design as in many boilers that have been in successful use for a long time.

In many cases where nuts have been used on the under side of the crowns of shallow fire boxes, particularly when soft coal has been used, they have been burned off, and in such instances the nuts are of no use; perhaps it may be that a good riveted head on the end of the bolt is better, beçause when the nuts burn off they do not leave any head whatever. Instances are on record where both the radial stay wagon top and the Belpaire boilers have had hot crown sheets which have blown down, but in several of these cases no serious damage was done to the engine or the men in charge, both crown sheets simply pulling off of the stay bolts and the steam escaping; but in all of these cases nuts were *not used* on the stay bolts, and it is probable that the extraction of the bolts, by pressure, from the sheets when hot was gradual and did not give rise to the explosion that might have followed if the bolts had held on until the sheets were very hot and the nuts on the ends of the bolts pulled through. At least this is the argument offered in the case of a hot crown sheet on the Burlington road, illustrations of which were given in the *Railroad Gazette* Feb. 7, 1890, where the bolts pulled through the sheets and did not have nuts on the under side, and no real explosion occurred.

It is argued in favor of the radial-stay, wagon-top arrangement that there is a gradual lengthening of the stays supporting the sides and crown sheet, and therefore that there is no abrupt change in the system of staying, and further that no particular series of stay bolts, such as those in the top of the Belpaire type of box, have to bear excessive strains. Also that, as the total expansion of the side sheet increases toward the top, and the lengths of the stay bolts increase also up to that point, the necessary lateral movement of one end of the stay is somewhat in proportion to its length, and thereby a decreased breakage results. It is well known that the top rows of stay bolts give more trouble than the lower ones in both the ordinary crown bar boilers and in the Belpaire type.

The Denver & Rio Grande has had a large experience with radial-stay, wagon tops, and in a private letter the Superintendent of Machinery and Rolling Stock writes: "We have never found a broken stay bolt of any kind in our radial-stay, wagon-top boilers."

It cannot but appeal to any one who is familiar with the difficulties arising from boiler incrustation that the absence of a multitude of stays crossing each other above the crown sheet is a point decidedly in favor of the radial stay, and also the Belpaire types, but in a lesser degree with the Belpaire, as that type has a greater number of stays. From fig. 5, which shows the back end of the radial stay type of boiler, it will be seen that there are longitudinal stays, attached to the T-irons on the back head, which pass between the radial stays longitudinally in the boiler. These stays are few in number, obstruct but little the circulation of the water, and offer but little opportunity for incrustation, whereas, in the case of the Belpaire, there is a large number of cross stays in rows directly above the crown, and also a number of longitudinal stays passing in among the cross stays.

While the radial-stay, wagon top boiler is very well adapted in its shape to resist internal pressure, and requires but little bracing, yet it must also be acknowledged that the parallel flat surfaces of the Belpaire box are extremely well situated with reference to each other to assist in a good bracing, and such an arrangement of sheets as in the Belpaire is one for which it is easy to design an almost perfect method of staying. The broad Belpaire crown sheet is one well adapted to absorb the heat from the fire, and yet the total area inclined over and toward the fire is greater in the radial stay top, as a rule, for equal area of fire-box heating surface. The difference in this respect is small, but scale is easier washed off from the sloping sheets than from the level sheets, and there is less obstruction to circulation of the water and to the rising of the steam through the water from the crown sheet in that boiler which has the least staying above the crown.

It is simply impossible to draw a conclusion from the facts at hand, showing either of these designs to be the better one, and all that remains to be done is to continue them in service and let each work out its own salvation; meantime the present interest in the fight for supremacy always incidental to that process of evolution which ends in the survival of the fittest will continue unabated.

The Bill of Lading Again.

The Chicago merchants, who first complained of the new bills of lading because they had a large stock of old ones on hand, and then expanded their grievance to cover the "not-negotiable" phrase, are still unconvinced, or at least the newspapers are, and the dispatches from that city indicate that the adverse feeling among the grain dealers shows no signs of abatement. Similar complaints have come from Philadelphia, Kansas City and elsewhere, and it is said that hundreds of banks refuse to continue the long-established custom of advancing money on drafts which depend for their value upon a bill of lading attached to them. It seems that the Chicago & Grand Trunk promises to continue the old form and it will possibly be joined by one or two other lines, so that the latest talk is about a boycott of those lines which adopt the new form.

This controversy is another illustration of the importance of having mere forms and technicalities, as well as the substance, just right. The ninth condition of the new receipt embodies an express provision by which a bill of lading made "to order" can be safely used as collateral; and the more concise language of this clause, together with stricter regulations about issuing duplicates really make the new bill superior to old forms; but instead of adding to the ninth clause "This paper is **NOT NEGOTIABLE** except as provided in this clause," the committee put the words "Not negotiable" in another place, so as to make that phrase and the ninth clause apparently contradictory. This little blunder is really responsible for all of the present disturbance.

The bill is just as negotiable as are the old forms, and the phrase is simply a statement of what the Supreme Court has decided. In fact, many bills, including those of important roads, have had these words printed upon them for a long time past. Chairman Blanchard has offered to stamp on the bills an additional clause explaining matters, but whether it will allay the irritation does not yet appear. He has also issued a letter telling shippers about the effect of court decisions, etc., but he does not seem to have succeeded in making the case clear to them.

As we intimated when speaking of the bill last May, it is a great pity that this and many other points did not have further discussion beforehand. No doubt the railroad lawyers in their discussions incident to the compilation of the new bill paid careful regard to the interests of shippers, and they may even have invited prominent counsel representing shippers' interests to participate in their deliberations. Many inconsistencies and superfluities have been thrown out and the new bill is, as the roads claim, a decided improvement on the diversity heretofore existing. But the fact remains that the shippers themselves, with their short and quick ways of judging things and of arriving at conclusions, are the men to be pleased. Satisfying their lawyers does not satisfy them. They trust in, or rather appeal to, the lawyers' judgment only in the last resort. In every-day dealings they mean to keep things in their own hands.

The complaints of shippers as to the clauses concerning responsibility for loss and damage are general and somewhat vague, but yet they will doubtless be pressed with considerable persistency and will have to be met if things are to run smoothly. On various details of this question we have heretofore expressed our opinion. Most of the irritating conditions are not new, to be sure; but the fact that they are old does not make them any more acceptable to shippers, and the changing of the form of bill was the proper occasion for modifying them. The principal point of contention now seems to be in the provision made for those shippers who decide not to use the uniform receipt. Shippers claim that they are compelled to use this form, and the roads reply that they are not, pointing to the simple provision made for shipping unconditionally. It is true that this provision is a simple one; it is merely an additional charge; but in practice, as every one knows, this additional price is so exorbitant that not one merchant in a thousand will accept the terms. He will fight any length of time first. The absurdity of charging $1.13½ for carrying 100 lbs. of dry goods from New York to Chicago under the common law when the price under the uniform bill of lading is only 75 cents is apparent without argument. The penalty imposed upon a grain shipper who has the temerity to insist upon his own terms is not so large, but the magnitude of the business is so much greater that the consequences to the roads are worse. An increase of even 10 per cent. would be regarded by him as nothing less than extortion, and his view would be sustained by most people. Again, what is to be done with the thousands of small shipments for which no receipt is given? The addition to the price on such shipments would probably average 25 per cent. To call the whole mass of long standing rates "reduced rates," in the sense that this term is used for a limited ticket, is a piece of sophistry which the Interstate Commerce Commission will let daylight through in short order.

The results of watch inspection on the Burlington system are reported monthly in pamphlet form, and the report for June has just been circulated. Mr. Raymond Gregg is the General Inspector for all of the eight roads included in the Burlington system, and he prints a table, filling 67 pages, giving the actual performance of the watches carried by all the employés who are required to conform to the standard, and a record of the synchronized clocks. On the Chicago, Burlington & Quincy proper there are about 700 conductors and engineers, and the list is filled out by firemen, yardmasters, and a few others. The number of days for which the record is made, and the number of seconds gained or lost during that period are given for each watch. The average number of days run by each watch inspected on the Chicago, Burlington & Quincy was 22½, and the average number of seconds variation for each watch per day 1¾. On the other roads in the system the average variation was 1½, 1⅝, 1¾, etc. The lowest average was on the Chicago & Iowa, 1¼ seconds per day. The maximum variation, which is in some respects a more important point for study, is not commented upon. In the 700 watches above referred to, some of which, however, seem not to have been examined at all during June, we find 69 which ran from 7 to 30 days without showing either gain or loss at the end of the period. Among the poorest records observed in a hasty glance are the following: Twenty-one days, 50 seconds: 7 days, 30; 7 days, 60; 3 days, 105; 14 days, 120; 7 days, 75 seconds; all of these were *lost* time. There seem to be fewer watches which gain time, and the amount of variation is perhaps somewhat less. The synchronized clocks apparently have not been in use long, and the master clock at Chicago did not "get down to fine work" until the latter part of the month. The clock at Pacific Junction, Ia., was on time 16 days during the month and for eight days consecutively.

The efforts made by the English railroads before Parliamentary committees to get permission to double their ordinary share capital are made for very practical reasons. As is well known, English capital is divided into debentures, preferred and ordinary shares. As the two former bear fixed rates of interest or dividends, the latter, the common stock as we would call it, gets the whole of any increase in the net revenue. Consequently the ordinary stock of some roads gets what in England is considered very high returns, the market price for such shares being also correspondingly high. This practically, as far as investors are concerned, makes each share double its original or book-keeping value. Financial companies have been formed which take advantage of this fact. They buy a large block of such high-valued stock, hold it, and issue against it their own stock of double or treble the amount at par, the latter bearing low rates of interest. These "turning" companies have made money by this process. The railroad managers care nothing about this as a matter of profit, but they ask that the railroads may be allowed to do for themselves what the "turning companies" have been doing for them, and for this reason: The concentration of large blocks of stock in the hands of a single person or company may at any time if voted upon by that party turn the election and upset the whole policy of the directors. These directors, therefore, are very anxious for the approval of Parliament upon their plans for stock watering—for, disguise it as they may, stock watering is what it amounts to. The Parliamentary committee has reported that the roads should be allowed to double their stock provided certain conditions are complied with, the reason given being that Parliament should not interfere in such matters unless public interest clearly requires it.

NEW PUBLICATIONS.

Gems and Precious Stones of North America. Royal 8vo; pp. 336. Eight colored plates and numerous minor engravings. Index. By George Frederick Kunz. New York: The Scientific Publishing Co., 1890. Price, $10.00.

When one first takes up this beautiful book he must wonder where the publishers are to get their profit from it, for it is really a work *de luxe*. The printers, the lithographers and the draughtsmen have united to make a remarkably handsome volume. The author is gem expert with Messrs. Tiffany & Co., and was assisted in the drawings by the artists of that house. The lithographs are by Messrs. Prang & Co., and are probably the finest work of the kind ever published. The gems illustrated are shown with wonderful brilliancy and transparency of color, and with a fidelity which one would hardly suppose possible.

The author has not aimed to make a complete treatise

on precious stones, but confines himself, as the title indicates, to those which occur in North America; but each chapter opens with a brief general description of the gems of which it treats, and an account of the principal sources of supply. The work is not a mere catalogue of the most remarkable stones known to have been found in this country, but it is a systematic description of the several species and varieties of precious stones and pearls, their occurrence, value, history and archæology. The illustrations are drawn from the finest known examples, and reference is made to the collections in which they may be seen. The work is, therefore, of great value to the archæologist and antiquarian from its numerous references to important examples of precious stones and pearls, and is full of accurate and interesting information for every one who cares for the matters of which it treats. Commercially, the subject is not a very important one. The estimated value of stones found in the United States in 1888, sold to be cut into gems, was but $27,200, and the value of those sold as specimens was but $37,650. In the same year diamonds and other stones, not set, were imported to the value of $10,473,329. But while the value of the gems found in North America is commercially insignificant, the general subject is one of great interest to an ever increasing number of readers, and Mr. Kunz treats it with learning and thoroughness.

TECHNICAL.

Manufacturing and Business.

The Marden Car Brake Co., of Boston, has just received an order for 200 of the Marden Steel Brake Beams from the Fitchburg road. The company is also shipping 1,200 beams to the Erie Car Works, Erie, Pa., for use on the freight cars under construction there for the New York & New England.

The National Paint Works of Williamsport, Pa., have the contract for painting the Ohio Connecting Bridge, Pittsburgh, which was illustrated recently.

The following companies have recently been incorporated in Illinois: Chicago Railway Device Co., of Chicago, to manufacture railroad devices. The capital stock is $100,000. The incorporators are William D. Fullerton and Marcus Hitch; the Chicago Journal Bearing Co., of Chicago; capital stock, $100,000; to manufacture roller bearings, journal boxes, car trucks, etc.; incorporators, William C. Brewer, Peter A. Pincoffs and S. C. Reber; Calorific Ventilating Heater Co., of Chicago; to manufacture ventilating and heating apparatus; capital stock, $50,000; incorporators, J. M. Brown, W. H. Hill and P. L. Hanscom. Columbia Steel Car Co., of Chicago, to manufacture cars, machinery and railroad appliances; capital stock, $1,000,000; incorporators, Patrick D. McArdle, Freeman J. Sport and Arthur H. Walker.

The Alabama Great Southern has ordered that all new cars built and old ones overhauled to be equipped with the National Hollow iron brake beam and the Hinson vertical hook coupler.

The Thomson-Houston Electric Welding Co. has built a machine especially for the welding of scrap steel to be drawn into fence wire for the Illinois Steel Co., which has tons of steel rod scrap which it has been obliged to melt over in order to utilize.

The Ries Electric Traction & Brake Co., of Baltimore, has been incorporated with a capital stock of $2,000,000, and has purchased the patents granted to Elias E. Ries for methods of and apparatus for increasing traction electrically, and for electric braking. The officers of the company are: John M. Denison, President; John B. McDonald, Vice-President; James Sloan, Jr., Treasurer; Elias E. Ries, Consulting Electrician.

Reginald Canning & Co., of 115 Broadway, New York City, who recently purchased the rolling stock of the Chautauqua Lake road from the Union Trust Co. of Philadelphia, consisting of three locomotives and 27 cars, now offer for sale of this equipment one Rogers locomotive with 17 x 24 in. cylinders and three passenger and two combination cars, built in 1887.

Iron and Steel.

The S. R. Smythe & Laughlin Co., of Pittsburgh, has an order from the Milwaukee works of the Illinois Steel Co., for a 7 × 4 ft. regenerative gas furnace for a 10-in. guide mill in the Milwaukee works.

Wm. Swindell & Bros., of Pittsburgh, Pa., have erected since Jan. 1, 1890, the following open hearth furnaces and gas producers: Two 20-ton and four large heating furnaces and 16 improved gas producers for the Passaic Rolling Mill Co., Paterson, N. J.; two 20-ton furnaces and eight gas producers for the Pottsville Iron & Steel Co., two 15-ton furnaces for Wm. Clark's Son & Co.; one 15-ton furnace for Howe, Brown & Co., Pittsburgh, and one 5-ton furnace for the Syracuse Steel Foundry Co., Syracuse, N. Y.

Another addition is being made to the Allegheny Bessemer Steel Works, at Duquesne, Pa. They will erect eight soaking pits with a heating capacity of 32 ingots every 20 minutes. The new pits will be built on a better plan than the old ones, and will be placed under one building, which will be about 50 × 80 ft.

The Vanderbilt Steel & Iron Co., of Birmingham, Ala., is about ready to blow in its new blast furnaces. This plant is fitted up with Massick & Crooke's hot blast fire brick stove by McClure & Amsler, of Pittsburgh, and a pair of Hamilton blowing engines, built by William Tod & Co., of Youngstown, O.

The Apollo Iron & Steel Co., of Pittsburgh, is building a new 24-in. mill at Apollo, Pa., and will soon erect a second one.

The De Bardeleben Coal & Iron Co., the Bessemer Iron & Steel Co., and the Little Belle Iron Co. have filed a declaration of consolidation in Alabama with a capital stock of $10,000,000.

The sheet mill of the Reading Iron Co. resumed operations this week, giving employment to 200 men, after three weeks' idleness.

R. S. Newbold & Son, of Norristown, Pa., have been awarded the contract for a train of rolls, squeezer, six steel boilers and a stack for a new rolling mill for Hughes & Patterson, on Beach street, Philadelphia, on the site of a mill formerly operated by Stephen Robbins.

Extensive repairs are being made at the Wheeling Steel plant, which has been closed down for a month, and it will be at least three weeks yet before the plant will be again running. The soaking pits are being rebuilt on an improved plan, and a new battery of boilers is being made.

The Rail Market.

Steel Rails.—Eastern mills report only a few sales of 3,000 ton lots and quote $31@$31.50. The Chicago and Pittsburgh mills report little business, but there are numerous inquiries for small lots. The quotations at these points remain at about $31.50@$32 at Pittsburgh for late fall delivery and $34@$35.50 at Chicago.

Old Rails.– The quotations are: $24@$24.50, nominally, in the East; $26.50@$27 at Pittsburgh for iron rails, and $21@$22.50 for old steel rails; at Chicago, $26@$26.50 for old iron rails, and $19.50@$20 for old steel rails.

Milwaukee City Water Works.

Messrs. Shailer & Schniglau, of Chicago, have received the contract for constructing the tunnel and shafts of the new water works intake for the city of Milwaukee. The contract price is $125,000.

The Tripp Bearings and Car Trucks.

The Tripp Manufacturing Co., of Boston, have recently made a shipment of anti-friction journal bearings to the Chicago & Northwestern for passenger car service; also electric car trucks to the Concord road, Concord, N. H.; Wilkes Barre & Suburban, Wilkes Barre, Pa., and Citizens' Traction Co., Pittsburg, Pa. The company is now manufacturing trucks for the following electric street roads: West Side, Milwaukee, Wis.; Citizens' Cable, Indianapolis, Ind.; St. Paul City, St. Paul, Minn.; Tacoma & Stellacoon, Tacoma, Wash., and Vancouver Electric, Vancouver, B. C.

The trucks manufactured by this company are equipped with Tripp's bearings, for which the company claims durability and simplicity.

Railroad Improvements at St. Paul.

Important improvements are being made by the Chicago, St. Paul, Minneapolis & Omaha and the Chicago, Milwaukee & St. Paul roads at St. Paul, Minn., on the east levee of the Mississippi River. The object of the changes is to facilitate the handling of freight and to complete a double track short line between St. Paul and Minneapolis, to be used jointly by the two roads named. The Omaha road began with the construction of a brick and stone freight station to take the place of the old wooden structure which has served the company for several years. This was completed and occupied last week, the work of construction having been performed by the company itself, at a cost of $52,000. The old depot is now being removed, and the space it occupies will be taken up by new freight tracks, which are badly needed. The tracks and switches in the yard will be entirely rearranged so that the joint double track used for passenger business will be outside of the yard limits. This track, which is now under construction by the company, will run from the St. Paul Union station to the Chestnut street station, about a mile above, where it will connect with a similar track now being constructed by the Milwaukee road, thus completing a double track line between the twin cities. The new track will also enable the Omaha road to run trains between its two local yards without crossing other tracks, as it has to do at present. Besides the construction of this new track, the Milwaukee road is building a heavy retaining wall along the base of the bluffs skirting the track for about half a mile. The total cost of the Milwaukee road's improvements will not be far from $75,000. Nearly all of the work is done by the company's own men, and very little is under contract.

THE SCRAP HEAP.

Notes.

The Lake Erie & Western has issued an order to agents of the company to arrest any one seen jumping on or off trains when they are in motion.

A Lake Shore & Michigan Southern freight crew was nearly overpowered by a gang of tramps at Ligonier, Ind., July 23. One brakeman was fatally shot by a tramp.

Freight traffic has been deranged and badly obstructed on the Cincinnati Southern and other roads of the Queen & Crescent System by strikes of yardmen at Lexington, Ky., and various other points.

Two men have been arrested at South Omaha, Neb., who, it is said, have stolen several hundred dollars' worth of brass by knocking off pressure-controlling valves from the air brakes of refrigerator cars.

Three men on a passenger train of the Chicago, St. Paul, Minneapolis & Omaha, near Duluth, July 22, threw pepper in the eyes of passengers and perpetrated a few small robberies. One of the men was captured.

The International & Great Northern has let contracts for the fencing of the entire line from Taylor to Laredo, Tex., a distance exceeding 300 miles. The cost will be $160,000, but without fences the company yearly pays in damages for live stock killed nearly $100,000.—*Exchange.*

Owing to several complaints a recent Prussian railroad ordinance forbids the use of seats in passenger cars for stowing away baggage, and of the overhead parcel receptacles only so much room is to be taken up by each passenger as can be properly made to correspond with the seating room paid for.

The New York Railroad Commissioners have reported on the locomotive boiler explosion on the Lehigh Valley at Buffalo May 11. Tests of fragments of the boiler were made by Prof. P. C. Ricketts, of the Rensalaer Polytechnic Institute, and the material found to be excellent. Low water was undoubtedly the cause of the explosion.

The freight conductors and brakemen of the South and North Alabama Division of the Louisville & Nashville have had their pay raised from $2.55 to $2.70 and from $1.80 to $1.90 per trip, respectively. Overtime is to be paid for according to a prescribed schedule. Heretofore it has not been paid for except in the form of gratuities.

The Central of New Jersey has issued a notice instructing passenger conductors to keep a sharp lookout for gamblers, and, it is said, has put special detectives to watch the trains running to the Monmouth races from New York. Another notice says that gambling must cease among the trainmen, and that the company will make an example of anybody caught at it.

The city of Worcester, Mass., has petitioned the Supreme Court for alterations in crossings of the Boston & Albany, New York, Providence & Boston and New York & New England roads at various streets, in accordance with the new law, by which the expense of such changes is partly borne by the state, relieving the municipalities considerably where land damages are heavy.

A large meeting of the Brotherhood of Locomotive Engineers was held in Winnipeg, Man., July 22. It is said that Chief Arthur declared that the order intended to extend its organization into Great Britain. Eight hundred members of the Firemen's, Conductor's, Trainmen's and Switchmen's Brotherhoods met at Toronto last week and passed a resolution for closer union of the various bodies.

The agents at the various stations of the Chicago, Rock Island & Pacific have been furnished with thermometers and blanks for making weather reports, which are to be sent daily on and after Aug. 1 to the Chief Train Dispatcher's office by telegraph at 7:30 a. m., 12:30 p. m., 5 p. m., 9 p. m., and 3 a. m. Chief Train Dispatchers are instructed to forward weather reports daily by train mail to the Superintendent of Telegraph at Chicago.

Seattle Street Railroads.

The rails for the West Seattle cable road have been laid in West Seattle for about two miles. The machinery for the power house and the cable pulleys have been placed in position. The road is to be operated in connection with the ferry across the bay between Seattle and West Seattle.

The Seattle Electric Railroad has about completed the Rollins street branch, and is now building a line around Lake Union to connect with it. The road will be extended to Fremont and Edgewater, suburban towns near Seattle.

Government Subsidies to Canadian Railroads.

The annual return giving the amount spent by the Dominion Government since confederation in 1867 in subsidies to railroads in the several provinces has recently been issued. The subsidies, excepting that for the Canadian Pacific main line and the Sault branch, were distributed as follows: Ontario, $1,970,846; Quebec, $2,428,344; New Brunswick, $890,118; Nova Scotia, $1,115,812; British Columbia, $750,000. The several lines built by the Dominion in each province, including the Intercolonial branches and extensions, but not the main line as originally constructed, were: In Quebec, including the purchase of Riviere du Loup branch, $5,426,323; New Brunswick, $2,371,854, and Nova Scotia, $7,821,070.

Pennsylvania Relief Department.

Superintendent R. F. Smith, of the voluntary relief department of the Pennsylvania lines west of Pittsburgh, in his first annual report, shows the following statistics of the department for the year ending June 30, 1890:

Company.	Employés.	Members.	Per cent.
Pennsylvania Co.	14,137	5,859	41.4
P. C. & St. L. Ry.	7,477	3,592	48.0
C., St. L. & P. R. R.	4,866	2,299	47.2
Total	26,480	11,750	44.4
General employés, including Union Line	1,028	418	40.6
Grand total	27,508	12,168	44.2

The membership is classed as follows: Officers, agents, clerks, etc., 1,879; telegraph operators, 391; conductors, 735; brakemen, 1,301; engineers, 870; firemen, 657; yardmen, 509; shop men, 3,434; trackmen, 2,302; total, 12,168. The average age of the members is 36.44 years.

Following is the financial showing:

Contributions by members	$161,353
Interest	901
Total	$162,254
DISBURSEMENTS.	
Death benefits, accident	$17,500
Natural	45,500
Total	$63,000
DISABLEMENT BENEFITS.	
Accident	$24,380
Surgical attendance	1,014
Sickness	40,567
Total	$66,461
Total disbursements	129,461
Balance	$32,793
DEDUCT.	
Outstanding disablement orders	$9,535
Estimated cost continued cases	29,045
Death benefit accrued	1,000
Total	$39,580
Deficit	6,786

The deficit in the statement for the year is due to the abnormal sickness prevalent during the winter.

Railroad Taxes in Missouri.

The Missouri State Board of Equalization makes the following assessment of railroad, bridge and telegraph property for the year 1890:

Road-bed and superstructure	$47,124,398
Rolling stock	8,928,458
Buildings on right of way	1,221,055
Telegraph lines	799,047
Bridges	2,250,000
Total	$60,322,959

This shows an increase over the assessment of 1889 of $2,902,638. The number of miles of railroad in operation in the state on June 1, 1889, subject to taxation for the year 1890, was 5,863, valued at $59,523,911, or an average of $10,169 per mile, including rolling stock, buildings on right of way and bridges.

Collision near Manchester, England.

A cable dispatch of Monday says: Two trains loaded with workmen engaged in excavating the Manchester ship canal, through the mistake of a switchman, came into collision this afternoon. Ten of the men were killed instantly and 60 injured, 30 of whom it is said fatally. Another account gives the number of killed as four. It does not appear whether the trains were work trains or composed of passenger cars.

North Dakota's Elevator Law.

A dispatch from Jamestown, N. Dak., says that no elevator in the state will store grain this year. This radical change in the handling of the crop has been kept as secret as possible. It was determined upon in order to evade the law, passed this year, which makes all public elevators and warehouses pay an annual license of $2.50 per 1,000 bushels capacity. Nine-tenths of the crop of the state has been heretofore bought by the elevator companies upon the Duluth and Minneapolis quotations. A farmer could store his grain in these elevators for fifteen

days for nothing, and keep it in store as long as he desired by paying a small fee therefor. Now the elevators will refuse this on the ground that they are not public elevators, and the farmer will be compelled to sell his crop at whatever price the company chooses to allow him. By the plan of forcing private buyers out of the small stations and agreeing upon a price the principal elevators of the state will have, as in the past, absolute control of this year's enormous crop. This crop will be so large that all the railroads combined cannot furnish cars to move it anywhere near as fast as required. If the elevators decline to store it, the confusion and dismay that will result will be great.

The Mexican Railroad Subsidy Loan.

The railroad subsidy loan of £6,000,000 sterling was awarded on July 22 to the banking house of Bleichroeder, of Berlin. The price on the loan is not known, but it is understood to be 88¾ per cent. with one per cent. commission. It is to bear six per cent. interest and is to be placed in Berlin and London, and, it is understood, in Amsterdam and Paris also. The bonds will be printed in English, Spanish, German and French.

A Large Iron Coal Breaker.

Coxe Brothers & Co. have completed surveys at Drifton, Pa., and will at once begin the erection of a new coal breaker, to be constructed wholly of iron. It will have a capacity of 3,000 tons per day, and when completed will be one of the largest in the anthracite coal fields. It will probably cost over $150,000.

Locomotive Fuel Mileage Card.

The locomotive fuel mileage card shown below was devised by Mr. E. W. Yates, Chief Clerk of the Motive Power Department of the Burlington road, at Aurora. The increased attention now being paid to the consumption of fuel by locomotives makes the proper tabulation of information such as this of interest.

The card gives all the data, furnished by the engineer, conductor and hostler, necessary for the calculation of the miles run per ton of coal, and pounds of coal burned per car mile. The car mileage is obtained by multiplying the distance between stations in miles by the number of cars hauled. Provision is made on the card for 24 changes in the make-up of the train between terminals. To facilitate the computation of these results, Mr. Yates has compiled a chart which shows exactly the product of any number of cars and any distance in miles.

The size of this fuel mileage card is 5¼ in. × 10¼ in. It is printed on heavy brown paper, with directions at the bottom for filling out, as shown. In addition to this there has been arranged a book, which is ruled and printed like the following sample page, in which may be copied in compact form the record for a whole month.

It is true that more attention is being paid to fuel consumption of locomotives per car mile than heretofore, but a still greater increased interest is shown for the consumption per ton mile, which last is a far more satisfactory class of information. A small change in this card woud adapt it for making records of ton-mile consumption.

LOCOMOTIVE BUILDING.

The Baldwin Locomotive Works are building 10 heavy engines for the Mexican Central, 12 for the Interoceanic and 12 for the Mexican Pacific. The firm also has an order for eight engines for export to Japan.

LOCOMOTIVE FUEL MILEAGE CARD.

xDate.....18..... xFrom..... xTo.....

xNo. Engine..... xEngineer.....

xNo. Train..... xFireman.....

Passenger Cars Hauled.		Loaded Freight Cars Hauled.		Empty Freight Cars Hauled.		Passenger Cars Hauled.		Loaded Freight Cars Hauled.		Empty Freight Cars Hauled.	
XX		XX		XX		XX		XX		XX	
No.	To Station No.	No.	To Station No.	No.	To Station No.	No.	To Station No.	No.	To Station No.	No.	To Station No.

XXXX Pounds of Coal on Tender at Starting, { XXXX Left in Tender on Arrival..... / XXXX Taken at Chute.....

Pounds of Coal Taken on Trip at x.....

do. do do x.....

Total.....

Pounds of Coal left on Engine at Terminal, xxx.....

Amount Used.....

Direction of Wind, x..... Miles Run to Ton of Coal.....

Condition of Rail, x..... Pounds of Coal Burned per car per mile, ...

Thermometer..... No. of Loaded Freight Car Miles.....

No. of Engine Miles..... do Empty do do do .....

No. of Pass. Car Miles..... Total Loaded do do do .....

DIRECTIONS FOR FILLING OUT THIS CARD.

1. Engineers will fill in items marked X.
2. Engineers will hand this card to conductors, the latter to fill in items marked XX.
3. Conductors will return card to Engineers on arriving at terminus.
4. Engineers will leave card in Cab for Hostlers to fill in items marked XXX.
5. Hostlers will hand this Card into Office at once.
6. Hostlers will obtain new Card at Office and fill in items marked XXXX, and put Card in Cab of Engine, thus replacing Card removed.

NAME OF ENGINEER OR FIREMAN .....

DATE 188 . Month.	No. engine.	No. train.	Name of fireman or engineer.	Engine miles.	Passenger car miles.	Freight loaded car miles.	Freight empty car miles.	Average passenger cars hauled.	Average loaded freight cars hauled.	Average empty freight cars hauled.	Miles run. Ton of coal.	Pounds of coal per car per mile consumed.	Pounds of coal consumed.	Thermometer.	Condition of rail.	Direction of wind.	From.	To.
1.																		
2.																		
3.																		
4.																		
5.																		
Average for month.....																		

The Louisville, New Albany & Chicago has purchased seven new engines from the Pittsburgh Locomotive Works. In addition to these five locomotives have been leased from other roads.

The Housatonic road is having 10 freight engines built.

The Nashville, Chattanooga & St. Louis is reported to have recently given out an order for twenty 50-ton engines.

The Raleigh & Gaston is building a large number of freight cars at its shops in Raleigh, N. C.

The Seaboard & Roanoke has ordered a number of ten-wheel consolidation coal-burning locomotives for the Georgia, Carolina & Northern road.

The Chicago, St. Paul, Minneapolis & Omaha has recently purchased a 75-ton switching engine, with 50-in. drivers, from the Baldwin works.

Locomotive Wanted.

The Ohio Valley Improvement & Contract Co., of Louisville, Ky., wishes to purchase either a new or second-hand engine for immediate service in track-laying and other construction purposes. A. E. Richards is President.

CAR BUILDING.

Thirty passenger and parlor cars are being built for the Housatonic.

The Mexican National will, it is reported, soon let contracts for about 500 box cars.

Three hundred box cars have been recently ordered by the Mexican Central.

The Ohio Falls Car Co. has completed three passenger cars for the Choctaw Coal & Railway Co.

The Baltimore & Ohio has received five passenger cars, one combination and one baggage car, which are to be used on the fast passenger trains between Jersey City and Washington. The passengers cars will accommodate 70 passengers and the combination cars 56. Altogether about 30 cars are being built for this line, 17 by the Baltimore & Ohio and 13 by the Philadelphia & Reading and Central of New Jersey.

The New York, New Haven & Hartford has let a contract for 50 standard passenger cars to the Pullman Car Co.

The Pennsylvania, Poughkeepsie & Boston has divided the contract for 500 freight cars equally between the Carlisle Mfg. Co., of Carlisle, Pa., and Murray, Dougal & Co., of Milton, Pa.

Schall & King, of York, Pa., have been awarded the contract for 200 box cars.

The United States Rolling Stock Works at Anniston, Ala., have just completed 35 cars for the Georgia, Southern & Florida, six for the East Tennessee, Virginia & Georgia, and eight for the Savannah, Americus & Montgomery.

The North Carolina Car Co., of Raleigh, N. C., has received an order from the Seaboard & Roanoke for 100 freight cars. One hundred more will be built at the Portsmouth, Va., shops of the Seaboard & Roanoke.

The Chicago, St. Paul, Minneapolis & Omaha has received five chair cars from the Barney & Smith Co., and 25 furniture cars and 25 refrigerator cars from the Terre Haute Car Mfg. Co.

The Ohio Falls Car Co. received a contract last week for 500 thirty-ton box cars for the Nashville, Chattanooga & St. Louis.

The Iron Car Equipment Co. has been chartered in New Jersey. The capital is placed at $2,500,000. The incorporators are John C. Brown, of New York City, Gen. Stewart L. Woodford, William A. Reed, and David A. Boody, of Brooklyn, Archer N. Martin and Haley Fiske, of Summit, N. J., and Conrad N. Jordan, of Englewood, N. J. The plant of the company will be at Summit, and the principal office at New York.

The Centropolis Car and Machine Co., of Centropolis, a suburb of Kansas City, Mo., has made an assignment. The liabilities are: Bonds outstanding, $40,000; shop, $24,300; S. K. Pardoe, $3,745; J. J. Baughan, $15,000, and other small amounts, which will make the aggregate about $95,000. The assets amount to $55,000.

BRIDGE BUILDING.

Beeville, Tex.—The contract will be let on Aug. 22 for the construction of an iron bridge, 200 ft. long, across the Medio River, near Beeville.

Belvidere, N. J.—The Delaware, Lackawanna & Western has commenced the erection of a steel bridge across the Delaware River above the Delaware Station to replace the present iron structure.

Easley, S. C.—Elias Day will let the contract on Aug. 7 for the rebuilding of the bridge over George's Creek.

Evansville, Ind.—The County Commissioners have let the contract for building the substructure for the Ohio street bridge over Pigeon Creek to Eigenmann & Hollerbach. There was only one other bid, that of Enos Hege, of Indianapolis. The substructure will cost in the neighborhood of $30,000.

Fort Payne, Ala.—W. H. Converse has received the contract to build two bridges—one across Town Creek, at $5,025, and the other across Will's Creek, at $2,094.

Huntington, Miss.—Ingram & O'Neil have received the contract to construct an iron bridge over Dusenberry's dam.

Lancaster, S. C.—The County Commissioners will let the contract this week to construct a bridge over Gill's Creek.

Nashville, Tenn.—The Nashville, Chattanooga & St. Louis is to build six new iron bridges on its road to replace the present structures. The new bridges are put in to prepare the road for the use of heavier engines.

Newport, Ark.—The Canton Iron Bridge Co., of Canton, O., has received the contract to construct an iron bridge over the Newport Lake.

Plattsmouth, Neb.—Davis & Davis, of St. Louis, have a contract to build a pontoon bridge, of hollow steel tubes, at Plattsmouth.

St. Charles, Mo.—Davis & Davis, of St. Louis, are constructing a pontoon bridge across the Missouri River, at St. Charles, which will be used by the steam line of the St. Louis Cable & Western when its extension is completed. The bridge will be finished in about 30 days.

Snohomish, Wash.—The Seattle, Lake Shore & Eastern will probably build a new iron bridge across the

Snohomish River to replace the present wooden structure.

Southbridge, Mass.—The New York & New England is to build two iron bridges on the Southbridge branch, one at Southbridge and the other at West Dudley, Mass.

Waddington, N. Y.—The Waddington Bridge Commission has decided to open subscription books on Oct. 15 at the office of the Washington Trust Co. in New York City. The capital stock is $250,000. The bridge is to be built across the St. Lawrence River, but the site has not yet been selected. The commission is to hold a meeting at Canton, N. Y., soon, when it is expected that this matter will be decided upon.

Wheeling, W. Va.—The sub-committee of the city council received nine bids for building the 158-ft. span stone arch foot-bridge over Wheeling Creek at Main street. Two of the bids were irregular and were not considered. The bid of Hallock Bros. was withdrawn by that firm before the work was let. The various bids for the whole work were as follows: Paige, Carey & Co., $109,583.50; Hallock Bros., $107,985.47; S. Harrold & Campbell, $112,185.75; B. B. Harris, $127,802.75; J. LeDuke & Co., $132,274.10; Jutte, Stratton & Foley, $139,941.02; Jolly Bros., $145,209.50. The contract was awarded to Paige, Carey & Co., of 45 Broadway, New York City. The calculations given above are for the largest possible amount of stone and excavation and the bridge is expected to be built for a less amount than the lowest bid. The bridge is to be finished before Dec. 1, 1890. The seven bids considered are given in detail below.

	Paige, Carey & Co., New York City.		Hallock Bros., Roofstown, Portage Co., Ohio.		J. L. Duke & Co., Berea, O.		S. Harrold & Campbell, Beaver Falls, Pa.		Jolly Bros., Pittsburgh, Pa.		Jutte, Stratton & Foley, Pitts., Pa.		B. B. Harris, Greensburg, Ind.	
	Dol	Ct.	Dol	Ct.	Dol	Ct.	Dol	Ct.	Dol	Ct.	Dol	Ct.	Dol	Ct.
For each cubic yard of grading approaches	....	75	....	70	....	30	....	40	1	....	....	60	....	40
" " " excavation in foundation pits for abutments, including refilling and removal of same	1	..	1	..	....	75	1	25	1	80	1	50	....	60
For each cubic yard of excavation in foundation pits of wings, including refilling and removal of same	....	50	....	42	....	90	....	60	1	80	1	50	....	60
For each cubic yard of excavation in foundation pits of abutments and wings removed over 300 ft. per 100 ft.	....	03	....	03	....	02	....	03	....	02	....	02	....	20
For each cubic yard of concrete (Portland cement)	7	25	7	40	6	50	9	00	7	50	7	36	9	00
" " " concrete (American cement)	5	50	5	50	5	00	7	00	8	....	6	....	6	15
" " " masonry laid in abutments in Portland cement mortar	12	25	12	25	14	....	12	50	11	50	11	....	12	95
" " " masonry laid in abut. in American cem. mort.	10	50	10	25	11	....	11	80	11	....	8	....	12	....
For each cubic yard of masonry used in arch sheeting, including centering and coating back of arch	16	....	15	....	27	....	16	50	33	50	27	07	21	40
For each cu. yd. of masonry used in wings and external spandrels.	8	....	8	....	11	50	9	....	11	50	12	50	12	....
" " " masonry laid in arch backing	8	....	8	....	6	....	5	56	6	80	8	....	7	....
" " " masonry used in retaining walls	8	....	8	....	6	....	6	80	11	50	9	....	9	....
" " " masonry used in parapet walls	21	....	20	....	30	....	18	....	15	....	27	07	21	....
" " " brick masonry used in interior spandrels	10	....	10	....	8	....	8	50	9	30	13	60	10	20
" " " granite (if used) for ring stones	50	....	52	....	38	....	....	....	55	....	55	....	40	....
" 1,000 ft. of white oak plank, used in drainage, per M., B. M	27	50	28	..	30	....	35	....	22	....	26	....	30	....
" lb. of wrought iron spikes used in drainage and dowels in coping, tie rods, nuts and washers, used in spandrels	....	05	....	05	....	05	....	05	....	06	....	31½	....	3.9
" lb of steel I beams, wall plates and brackets	....	05	....	05	....	04½	....	04	....	06	..	04	....	3.7
" lineal ft. of vitrified clay pipe of 12 in. diameter, used in drainage	....	30	....	30	....	38	....	75	....	40	....	37½	....	75
" lineal ft. of vitrified clay pipe of 18 in. diam.. used in drainage	....	35	....	27½	....	65	125	....	....	65	....	48	....	85
" lineal ft. of vitrified clay pipe of 24 in. diam., used in drainage	....	50	....	55	....	120	2	....	1	25	....	87	1	37
" lineal ft. of Medina sandstone in curbing set	1	....	....	98	....	65	....	80	....	75	....	75	1	....
" sq. yd. of flagging laid	2	....	2	05	2	....	2	25	1	60	3	....	2	80
" sq. yd. of brick paving laid	1	50	1	55	1	25	1	30	1	35	1	50	....	85
" insulated pole set	150	....	140	....	45	....	25	....	150	....	45	....	35	....

RAILROAD LAW—NOTES OF DECISIONS.

Carriage of Goods and Injuries to Property.

In the United States Court it is ruled that where an unconditional release of a carrier from liability for loss or damage to goods in transit comes into the hands of a connecting line, together with the goods shipped, it is notice to the connecting line of the illegality of the transaction, and on loss its liability must be determined by the principles of the general law.[1]

In Texas the Supreme Court holds that where the court finds that the fire escaped from defendant's train, which had stopped opposite the posts, by reason of defendant's negligence, and that by defendant's negligence a large quantity of bark had been allowed to accumulate in that place, by which the fire was communicated to the posts, and that plaintiff was not guilty of negligence in placing the posts on the right of way, it is the province of the court to say that plaintiff was not guilty of contributory negligence. And in an action against a railroad for negligently allowing fire to escape from its train, whereby certain posts of plaintiff were burned, which he had placed on defendant's right of way without the authority of defendant, but where it was the custom to place freight for shipment over defendant's railroad with its acquiescence, plaintiff was not guilty of contributory negligence.[2]

In Nebraska, in an action for the value of a cow killed within the corporate limits of a city, the only questions were whether the employés of the company were negligent, and whether plaintiff was guilty of negligence in permitting her to run at large in violation of the city ordinances. The Supreme Court holds that the ordinances of the city limiting the rate of speed at which trains of cars might be run, and prohibiting the owners of cattle from allowing such stock to run at large, were proper evidence, but neither was conclusive proof of negligence, even if violated.[3]

In New York the Supreme Court rules that no evidence is necessary to show that a fence 2 ft. 8 in. high in places is insufficient, as the jury may act on their knowledge of that fact.[4]

In Michigan a right of way through land, about midway between stations two or three miles distant, was granted by a deed which provided that if "it should cease to be used and operated as a railroad . . . this release shall cease to be operative, and the right of way granted thereunder shall terminate." The grantee consolidated with a company whose track ran between the stations referred to by a different route, and thereafter the grantee's track was used only for storing cars. The Supreme Court holds that the right of way was forfeited.[5]

In New York the Supreme Court rules that under the Statute of 1850 relating to condemnation proceedings, a railroad company may maintain a petition for the condemnation of a right of way, though its road has been already constructed, and though the past use of the easement, without compensation, constituted a continuing trespass.[6]

In Kansas the Supreme Court holds that until the payment of the condemnation money or its deposit as required by law, a railroad corporation obtains no right to the land attempted to be appropriated, excepting a right to make a survey.[7]

In New York the Supreme Court rules that an easement of light, air, and access vests in a grantee of land abutting on a public street: and, after entering on the land, his enjoyment of the easement is a sufficient possession to enable him to maintain trespass for its appropriation for the purposes of an elevated railroad.[8]

The same court holds that where plaintiff or his grantor has paid an assessment for the improvement of the street in front of and adjacent to his premises, he has an easement of light, air and access to that street which cannot be taken without due process of law. The operation, in a street, on which abuts property owned in fee by plaintiff, of an elevated railroad, the engines of which emit smoke, gas, steam and cinders, which at times enter plaintiff's premises through his doors and windows, and permanently lessen the rental value of the premises, deprives plaintiff of his property, within Const. N. Y., art. 1, § 6, providing that no one shall be deprived of his property without due process of law; and it is immaterial whether or not plaintiff owns any interest in the fee of the street.[9]

In Minnesota the Supreme Court holds that where suburban property was divided into lots for purposes of sale, and with nothing to show that it was intended to be used as one tract, a railroad company, on taking portions of certain lots for railroad purposes, is liable only for the damages to the lots from which a part was taken, and not for damages to the whole tract.[10]

Injuries to Passengers, Employes and Strangers.

In New York, in an action for injuries sustained by a passenger on defendant's railroad, it appeared that the cars were so crowded that, when the engineers gave the signal to put on the hand-brakes, the trainmen could not get at one or more of the brakes in time to avoid the collision which caused the injury. The Supreme Court rules that whether there was any negligence on the part of defendant arising from this state of facts was a question for the jury.[11]

In Missouri the Supreme Court decides that in an action for injuries received in getting off a moving cable car, by a car passing on another track, evidence that the cars were running at a higher rate of speed than was authorized by city ordinances, coupled with some evidence that the bell on the passing car was not rung, is sufficient to show negligence of defendant.[12]

In Texas the Supreme Court rules that allegations in a petition against a railroad company for personal injuries, that plaintiff was put to great inconvenience and delay; that he was expected at a certain city on a certain day, but was unable to reach it; that the weather was bitterly cold and the place of the accident not near any house, and he was forced to walk back to the nearest town for shelter and suffered greatly thereby; and that, by reason of said inconvenience and delay, he was damaged in the further sum of $500, are too vague to warrant an allowance for convenience.[13]

In Pennsylvania it appeared that the plaintiff was a passenger on one of defendant's open summer cars, the seats of which ran across the entire width of the car, the entrance being on the side. On rising to signal the conductor to stop, he tripped over an obstruction and fell from the car. The obstruction, which could be seen by any one looking at the spot, consisted of the sheathing over the wheel of the car, which, as in all such cars, extended above the floor, but left ample room for entering and getting off. The car was not defective in any respect, and there was no evidence that any better or safer construction in this kind of car was ever used, or was possible. The Supreme Court holds the railroad not liable.[14]

In Nebraska the plaintiff, a switchman, while standing on the top of a car, was injured through a locomotive being sent violently against the car. The engineer testified that on approaching the car he reversed the engine, and in so doing placed the reverse lever in its proper position, adjusting the dog in the proper notch of the quadrant; but that, after the locomotive had run about 20 ft., the dog became loosened and the lever flew back, taking the engine from under his control. It appeared that if the appliances were well made, and the lever was properly locked by the dog, the lever could not fly back, unless there was some sudden movement or jar of the engine, and there was no such movement or jar. If the dog had not been properly placed in position the lever would not have remained in position as long as the engineer testified it did. The latter also testified that upon two other occasions the lever became released in the same manner. The Supreme Court rules that it was for the jury to say whether the lever became detached through defective construction or through the fault of the engineer.[15]

In Massachusetts the Supreme Judicial Court rules that one witness having testified that the pile of sleepers, which was three or four feet wide, and lay within 18 in. of the track, and which caused an injury to a brakeman, had been left there by sectionmen for five weeks, and others that they had only been there two or three days, there is evidence for the jury of negligence in the supervision of the road.[16]

In Texas the Supreme Court holds that a foreman in the repair department of the shops of a railroad company, with power to employ and discharge hands, is not the fellow-servant of those under his control, but the representative of the company.[17]

In New York the Supreme Court rules that an ordinary train dispatcher is the fellow-servant of a locomotive fireman, for whose injuries, caused by the negligence of the train dispatcher, the railroad company is not liable, where it appears that the company had exercised care in the selection of a train dispatcher, and had prescribed adequate, specific and intelligible rules for his instruction and government.[18]

In Massachusetts a car inspector and repairer who was at work between cars was injured by a car being "kicked" up against the cars behind him, and pushing them forward upon him. The Supreme Judicial Court decides that if his request to the conductor of the train to leave the space open be taken as notice of his being between the cars, then the omission to heed this notice and the kicking up of the car while he was there were the negligence of fellow-servants.[19]

1 Woodburn v. Cinn., N. O. & T. P. R. Co., 40 Fed. Rep., 731.
2 Gulf, C. & S. F. Ry. Co. v. McLean (T.), 12 S. W. Rep., 843.
3 Chicago, B. & Q. R. Co. v. Richardson, 44 N. W. Rep., 103.
4 Leyden v. New York Cent. & H. R. R. Co., 8 N. Y. S., 187.
5 Hickox v. Chicago & C. S. R. R. Co., 44 N. W. Rep., 143.
6 Met. El. Ry. Co. v. Dominick, 8 N. Y. Supp., 151.
7 C., K. & W. R. Co. v. Watkins, 22 Pac. Rep., 985.
Ross v. Manhattan El. R Co., 8 N. Y. Supp., 495.
9 Stevens v. N. Y. El. R. Co., 8 N. Y. Supp., 313.
10 Koerper v. St. Paul & N. P. Ry. Co., 44 N. W. Rep., 195.
11 Diabola v. Man. R. Co. 8 N. Y. Supp., 334.
12 Weber v. K. C. C. R. Co., 12 S. W. Rep., 804.
13 Missouri Pac Ry. Co. v. Mitchell, 12 S. W. Rep., 810.
14 Farley v. Philadelphia Traction Co., 18 Atl. Rep., 1090.
15 B. & M. R. Co v. Wallace, 44 N. W. Rep., 223.
16 Babcock v. Old Colony R. Co., 23 N. E. Rep., 325.
17 Missouri Pac. R. Co. v. Williams, 12 S. W. Rep., 835.
18 Hankins v. New York, L. E. & W. R. Co., 8 N. Y. Supp., 272.
19 Whitmore v. Boston & M. R. Co., 23 N. E. Rep., 220.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Mahoning Coal, 2½ per cent., payable Aug. 1.
St. Paul, Minneapolis & Manitoba, quarterly, 1½ per cent., payable Aug. 1.
Terre Haute & Indianapolis, 3 per cent., payable Aug. 1.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Anniston & Montgomery, special, Anniston, Ala., Aug. 2.
Boston, Hoosac Tunnel & Western, annual, Grand Union Hotel, Saratoga Springs, N. Y., Aug. 20.
Troy, Saratoga & Northern, annual, Grand Union Hotel, Saratoga Springs, N. Y., Aug. 20.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Traveling Passenger Agents' Association* will hold its next annual convention at Buffalo, N. Y., August 19.

The *New England Roadmasters' Association* will hold its eighth annual meeting at Boston, Mass., Aug. 20 and 21.

The *National Association of General Passenger & Ticket Agents* will hold its next semi-annual meeting at Denver, Col., Sept. 17.

The *American Society of Railroad Superintendents* will hold its annual meeting in New York City on the day preceeding the fall meeting of the General Time Convention.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m. The Club has adjourned until Tuesday, Sept. 16.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *Northwest Railroad Club* meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Saturday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m. on the third Wednesday in each month. The next meeting will be held the third Wednesday in September.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at

7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the Southwest* holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7.30 p. m., on the third Saturday in each month.

The Civil Engineers' Club of Kansas holds regular meetings on the first Wednesday in each month at Wichita, Kan.

The Iron and Steel Institute, of England.

The following is a provisional list of the papers to be read at the meeting of the Iron and Steel Institute in the United States in October:

"On American Blast Furnance Yields." By James Gayley, Pittsburgh, Pa.

"On Testing Materials of Construction in the United States." By Hunt & Clapp, Pittsburgh.

"On the Manufacture of Steel in the United States." By Henry M. Howe, Boston.

"On the Thomson Electric Welding Process." By Professor Thomson, of New York.

"On the Manufacture of Spirally Welded Steel Pipes in the United States." By J. Bayles, New York.

"On the Development of the Iron Manufacture of Virginia." By E. C. Pechin, Cleveland, Ohio.

"On the Use of Water Gas in the United States." By B. Loomis, Hartford, Conn.

"On the Coke Industry of the United States." By J. D. Weeks, Pittsburgh.

"On Recent Progress in the Manufacture of War Material in the United States." By W. H. Jaques, Bethlehem, Pa.

"On the Composition and Wearing Qualities of Steel Rails." By Dr. Chas. B. Dudley, Altoona, Pa.

At the international meeting at Pittsburgh, in addition to the expectation that Sir I. Lothian Bell and Dr. Wedding will present papers; two have been announced by name:

"On the Protection of Iron and Steel Ships against Foundering from Injury to their Shells, including the use of Armor." By Sir N. Barnaby, K. C. B., London.

"On the Recent Development of Marine Engineering." By A. E. Seaton, Hull.

PERSONAL.

—Mr. J. P. Hovey, Division Master Mechanic of the Union Pacific at Omaha, has resigned that position.

—Mr. A. L. Horner, Superintendent of the Pacific and Cascade divisions of the Northern Pacific, at Tacoma, Wash., has resigned, to take effect Aug. 1.

—Mr. Frank Thomson, First Vice President of the Pennsylvania, sailed for Europe Thursday of this week, accompanied by his family and a party of friends. He expects to return in about a month.

—Mr. W. C. Rinearson, who for the last two years has been Assistant General Passenger Agent of the Western Division of the New York, Lake Erie & Western, with headquarters at Cleveland, has been chosen to succeed Mr. L. P. Farmer as General Passenger Agent. Mr. Rinearson was formerly General Northern Passenger Agent of the Erie, and for 12 years previous to that had been connected with the Pennsylvania.

—Mr. William Kerrigan, formerly General Superintendent of the Missouri Pacific, and for some years past a railroad contractor, died in St. Louis last week. He was for some time Division Engineer of the Cairo, Arkansas & Texas, and later Superintendent. He was also Superintendent of the St. Louis, Iron Mountain & Southern, and then General Superintendent of the Missouri Pacific.

ELECTIONS AND APPOINTMENTS.

Alabama Midland.—The following appointments have been made, taking effect on Aug. 1: H. S. Haines, General Manager, and C. D. Owens, Traffic Manager.

Bristol (Vermont).—The officers are: President, James Ridley; Vice-President and Superintendent, George A. Ayer, and Chief Engineer, Col. John M. Fitch. The office is at Bristol, Vt.

Chattanooga Southern.—The officers of this company are now as follows: C. E. James, President; F. R. Pemberton, Vice-President; W. W. Harrison, Second Vice-President, and J. W. James, General Manager, all of Chattanooga, Tenn.

Gadsden & Montgomery.—The following officers were recently elected: Col. W. H. Denson, of Gadsden, Ala., President, and C. E. Payne, of Birmingham, Secretary and Treasurer. The following directors were elected: W. H. Denson, C. E. Payne, J. H. G. Martin, E. W. Booker, Jackson E. Long, Dr. E. P. Chandler, Edwin T. Martin, and S. W. Riddle, of Gadsden.

Hamilton & Kingston.—The incorporators are: Charles D. Haines, Elmer T. Haines, Andrew G. Haines and John Milton, of Kinderhook, N. Y. The principal office is at Kingston, Mo.

Hannibal & St. Joseph.—L. F. Goodale, at present Acting Chief Engineer, has been appointed Chief Engineer of the above road and the Kansas City, St. Joseph & Council Bluffs, to take effect Aug. 1.

Iron Range & Huron Bay.—The directors of this company are: James M. Turner, Lansing, Mich.; Jas. F. Joy, C. H. Buhl, T. D. Buhl and Henry Stephens, all of Detroit. J. M. Turner is President and Milo H. Davis, of Detroit, is Chief Engineer and Superintendent of Construction.

Lehigh & Hudson River.—Samuel Sayer has been appointed Traveling Freight Agent of this company, with office at Warwick, N. Y.

Oregonian.—C. B. Williams has been appointed Auditor of this company, vice A. L. Warner Acting Auditor, resigned.

Parry Sound.—At a meeting the following directors were elected: William Beatty, P. McCurry, John McClelland, Thomas S. Walton, J. M. Ansley, David Beatty, Samuel Armstrong, James W. Fitzgerald and George G. Gladman. The directors elected P. McCurry President.

Rio Grande Western.—J. Thompson has been appointed Superintendent of Bridges and Buildings, to succeed J. A. Fustabend, resigned.

St. Joseph, Tarkio & Northwestern.—The following officers have been elected: David Rankin, President; James Craig, Jr., Vice-President; Charles R. Berry, Secretary, and August Schuster, Treasurer.

Sioux City & Northwestern.—The incorporators are: J. F. Duncombe, of Ft. Dodge, Ia.; S. L. Dows, of Cedar Rapids, and D. T. Hedges, F. P. Gere and A. S. Garretson, of Sioux City, Ia.

West Shore Line.—Arrangements having been made to separate the management of the West Shore and Hoosac Tunnel fast freight lines, David Brown has been appointed Manager of the West Shore Line, with office at Chicago, to take effect Aug. 1.

RAILROAD CONSTRUCTON.

Incorporations, Surveys, Etc.

Alabama, Georgia & Florida.—A survey has been begun by W. S. Green, of Columbus, Ga., Chief Engineer, at Birmingham and Bessemer, Ala., for the northern division of this road. The country in that neighborhood is very mountainous and a long tunnel will have to be built through Shades Mountains. Surveyors on the southern division have finished the line to a point near the Chattahoochie River beyond Simpkin, Ga.

Atlantic Coast Line.—The locating survey has been made for the extension of the Wilmington, Columbia & Augusta from Fayetteville southeast to Rowland, N. C., the northern terminus of the Florence branch. The distance is about 41 miles. The contract for the grading will probably be let within a few weeks and the work commenced early in September.

Autaugaville & Northern.—The preliminary survey of this line has been finished. It is to extend from Autaugaville, Ala., to Booth's on the line of the Montgomery, Tuscaloosa & Memphis, eight miles. There will also be two miles of branches. The charter will soon be applied for. The work is light, and the line opens up a fine farming section and excellent yellow pine and hard wood timber. The maximum grade is two per cent., and the maximum curvature is four degrees. M. M. Smith, of Autaugaville, is President, and Frank C. Faust, of Prattsville, Ala., is Chief Engineer.

Baltimore & Eastern Shore.—There has been some delay in finishing the last section between Vienna, on the Nanticoke River, to Salisbury, Md., 17 miles. The track is now being laid between these points from Salisbury and will soon be completed. The bridge over the Nanticoke River is also nearly completed. The Wycomico & Pokomoke road, between Salisbury and Ocean City, is to be entirely reconstructed. Many of the curves will be eliminated, the road bed ballasted, new bridges built and new ties and rails laid.

Birmingham, Jackson & Kansas City.—At elections held in Jackson and Dyersburg, Tenn., last week, this company was voted subsidies of $60,000 by the former town and $25,000 by the latter in aid of the proposed road between Jackson and Dyersburg.

Birmingham Mineral.—Grading on the six-mile extension of the Tuskaloosa branch is complete and tracklaying is in progress. The road will be finished to Brookwood, the location of the Standard Coal Co.'s mines, this week, and will be built no further at present. Chief Engineer W. Taylor says the report is not true that engineers of the Birmingham Mineral are surveying the route into Tuskaloosa. It is not the intention of the company to build beyond Brookwood, 17 miles from Tuskaloosa, at present.

Bristol.—This road, referred to last week, is projected to extend from New Haven to Richmond, Vt., through the towns of Bristol, seven miles; Monkton, 14 miles; Hinesburgh, 22 miles, to Richmond, a total distance of [illegible] miles. The contract for the first section from New Haven to Bristol to O. M. Galiup, of St. Johnsbury, Vt., whose headquarters will be at Bristol. The right of way has been about secured for the first section. There is a grade of 150 ft. The maximum curvature is eight degrees. The longest bridge is 300 ft. Three other short ones will be erected. The company will use 60-lb. second-hand rails. John M. Fitch is Chief Engineer.

Central of Georgia.—R. C. Strother, sub-contractor under Worthington & Co., of Birmingham, Ala., has commenced grading about three miles from Troy, Ala., on the Andalusia extension of the Mobile & Girard Railroad, for the Vankirk Land & Construction Co. Mr. Strother has the contract for the entire work from Troy to Andalusia.

Chesapeake & Ohio.—Howard & Sears, of Eagle Rock, V., who have the contract for building the Craig Mineral road, now called the Craig branch of the above road, have sublet the work to the following contractors: The first 10 miles of grading let to J. C. Carpenter; sections 11 to 14 to Rheinhart & Teaford; sections 15 to 18 to Gooch & Waugh, and sections 19 to 22 to Rheinhart & Patton. Sections 22 to 27 have not been sublet. The headquarters of all these firms are at Eagle Rock, Va. All the masonry work has been let to Rosazza & Moltini. The road will cost about $20,000 per mile. The maximum grade is 36 ft. per mile with the traffic and 50 ft. per mile against the traffic. The maximum curves are 12 degrees. There is an iron bridge with three spans 150 ft. long each, and four spans 112½ ft. each. H. E. Tallbot is Assistant Engineer in charge of the work, with headquarters at Eagle Rock.

Chicago, St. Paul, Minneapolis & Omaha.—A survey is being made for an extension of this road between Randolph and Hartington, Neb. It is not yet known what place will be made the terminus. The main line of this road is being shortened about two miles between Baldwin and Hersey, Wis.

Cleveland, Cincinnati, Chicago & St. Louis.—One or two branch lines from the White Water road (which is owned by this company) are under contemplation. First, a branch from Laurel Station, westerly in the direction of Greensburg, Ind., about four or five miles to the stone quarries, which will in all probability be built this summer. It will not be done by contract, but by pay-roll labor. The cost will be about $40 000. The other branch will not be built by the company, but will be constructed by the citizens of Richmond, Ind., who desire a connection with the line. It is expected that this line will be built shortly. Two other lines are contemplated, one from Beeson station, seven miles north of Connersville, eastwardly toward Richmond, a distance of about 19 miles. The other line contemplated is from Richmond directly south through Liberty, a station on the Cincinnati, Hamilton & Indianapolis to Brookville, where it will connect with the White Water road giving a much shorter line to Cincinnati than the first line, but requiring the construction of about 30 miles of road. The company will also begin within the next week or 10 days, the securing of rights of way along the proposed line from Springfield to Columbus, Ohio. It expects to have the line ready for work within the next 60 days. This line is about 40 miles in length and runs directly east from Springfield to Columbus. The White Water road will also be built north from Hagerstown, a distance of about eight miles, to Losantville on the Peoria Division of the road, from the Ohio, Indiana & Western Co. The report recently circulated that the company would build a line from Greensburg to Richmond on the route surveyed by the Evansville & Richmond is denied by an officer of the company.

Colorado Midland.—The contract for the Busk-Ivanhoe tunnel through the Rocky Mountains has been let to Michael H. Keefe, of Butte, Mont., who has just completed a long tunnel 7,000 ft. long for the Montana Central. The contract calls for the completion of the work in 20 months. The work on the approaches has been commenced. The various dimensions of the tunnel were given in these columns July 18.

Delaware River & Lancaster.—The French Creek branch of the road is nearly finished between Phœnixville and French Creek Falls, Pa., and the contract for the remainder of the road to Lancaster has been signed. The route from Falls is across the Wilmington & Northern Railroad to Springfield, to Churchtown and through the Contestoga Valley, striking several important towns and connecting with the Reading & Columbia road near Manheim. The distance to be built is over 25 miles. Lebanon will be reached over the Cornwall road from Manheim, and Lancaster and Columbia over the Reading & Columbia road. The parties to the contract are the Delaware River & Lancaster, Wilmington & Northern and Philadelphia & Reading roads. Two engineer corps will locate the route this week, and the New York Construction Co., George Potts, Manager, will commence grading the line.

Denver & Rio Grande.—About 14 miles of the grading on the narrow gauge line from Villa Grove south to Alamosa, Col., is reported completed. This work will probably be entirely finished by the middle of the month. The tracklaying will be commenced in a few days at Alamosa. The culverts and bridges have been completed from that point north for a distance of about 10 miles. The extension is being built through a fertile country in the San Luis Valley, and will connect the narrow gauge divisions of the company in the eastern part of the state.

Easton & Northern.—An engineer corps is making surveys in Easton, Pa., for a line through the town for this road to connect with the Lehigh Valley. Within two or three weeks the tracks of the company will be completed as far as the road is graded in this city, and trains can then be put on. The location of a line through the city has long been delayed because of its difficult solution. A tunnel is said to be too expensive. The only other short line is through Third street, and this meets with general opposition by the citizens. The connection will very probably be made by the Delaware River front, though there are some serious obstacles in the way.

East Tennessee, Virginia & Georgia.—In refe ence to the recent report that the company proposed to build a new line from Mobile to New Orleans, paralleling the Louisville & Nashville, President S. Thomas states that the matter has not been formally taken up yet for consideration. There are strong local inducements offered by the cities and towns in that section to build such a line, but he could not say at the present time whether it would be built or not.

East & West of Alabama.—The road is now operated as a standard gauge from Ragland to Fish River, Ga. The gauge is being changed as far as Pell City as rapidly as possible. The entire line will be operated as a standard gauge in a few days. Among other improvements made is the construction of a new iron drawbridge across the Coosa River replacing the old wooden structure.

Evansville & Richmond.—The tracklaying has not yet begun on the extension to Westport, Ind., as recently stated. The contractors for the grading, Oliver Ferguson & Sons, have that work nearly finished, and will probably have it all completed within ten days, when the tracklaying will begin. This work will not be done by contract, but by men employed by the company. The maximum grade is 52.8 ft. per mile and the maximum curves are four degrees. There are two bridges, each 100 ft. long.

Ferney Mountain.—Grading is in progress on the first five miles of this road, which is to extend from Ferney station on the Philadelphia & Erie, to Waterville, on the Fall Brook Coal Co.'s line, a distance of about 21 miles. It is expected to have the road completed before January. William Boyer, who has been awarded the contract, is also the Superintendent. M. M. MacMillan, of Mahoning City, Pa., is General Manager.

Gadsden & Montgomery.—The company claims that it will be prepared to let the contracts for part of the line in the latter part of September. The preliminary survey has been made between Gadsden and Montgomery via Pell City and Shelly, Ala. The distance is about 100 miles. W. H. Denson, of Gadsden, Ala., is President

Genesis & Obed River.—The contract for building the first five miles of this road from Crossville, Tenn., has been let to G. W. Youngs, of Ahnapee, Wis. The grading is to begin about Aug. 25. A survey has been made for about 60 miles through Cumberland County, and the right of way for part of this distance has been secured. The Cumberland County Court has exempted all the property of the company from taxation for 20 years.

Haines' Hamilton & Kingston.—This company has been organized to succeed the Kingston & Polo Short Line. The articles of incorporation were filed in Missouri last week by Charles D. Haines and others, of

Kingston, Mo. The road is to extend from Kingston, north a distance of about six miles, and connect with a line built a few years ago by the Tom Creek Coal Co., from the Hannibal & St. Joseph road south to its coal mines, about three miles distant. The surveys have been completed and the right of way secured. Grading will probably be commenced soon. The line will be built by Haines Bros., who will receive a subsidy of $23,500 voted by the towns.

Iron Range & Huron Bay.—The surveys are being made for this line between Huron Bay to Champion, Mich., and will soon be completed. The road is to be about 40 miles long and will extend southeasterly through Baraga and Marquette counties. The contracts are to be let Aug. 14 and it is proposed to begin grading on Aug. 20. The work is generally light, the maximum grades being 50 ft. to the mile and the maximum curves are five degrees. Milo Davis, of Detroit, Mich., is Chief Engineer.

Kansas City, Nevada & Fort Smith.—The contract for the tracklaying on 50 miles of this road, between Grand View and Amorot, in Bates County, Mo., will be awarded in a few days. The grading is in progress between these points, and will be entirely completed in 30 days. It is intended to complete the line between Kansas City and Amorot, and place it in operation between these points before the extension south of the latter town will be commenced.

Kansas City Suburban Belt.—The company hopes to have the entire 12 miles completed in about 60 days. The grading has been finished on about seven miles of the heaviest work, and three and a quarter miles of double track has been laid from the station at Wyandotte and Second street, Kansas City, Mo. The terminus of the line will be at Brush Creek, where it will connect with the Kansas City, Nevada & Fort Smith.

Kansas City, Wyandotte & Northwestern.—The newspaper reporters have failed to get Mr. Jay Gould to admit that he has purchased this road, as recently reported. Mr. Gould will only say that he has given no authority for the statement and that his interest in the line is that of a bondholder.

Kennebec Central.—The railroad commissioners having formally accepted the line, regular trains commenced running last week between Randolph and Togus, Me., a distance of five miles.

Kickapoo Valley & Northern.—About a hundred men are working on the first 30 miles of this road from Waukesha, Wis., north toward Wilton. The distance between these points is 80 miles, and it is stated that financial arrangements have been made for completing the road for this distance. The United States Construction Co. has the contract for grading and tracklaying and equipping the line. The company claims that the first 50 miles will be completed by next January, and that the road will be in operation to Wiltor within a year. There will be six bridges on the line. The maximum grade is about 3 ft. per mile. B. F. Whashburn, of Excelsior, Wis., is one of the directors.

Kings County Elevated.—The company is reported to be seriously considering an extension of its system by a steam surface road from the city line of Brooklyn through populous Long Island towns, perhaps as far as Patchogue.

Kinzua & Hemlock.—The grading has already been commenced on this road, which was incorporated this month in Pennsylvania, and is to extend from Camp Halsey down the Kinzua Valley to the confluence of the north and south Kinzua Creek, a distance of 14 miles. About 100 men are engaged on the work at present. The line is being built to open up timber land in Northern Pennsylvania, owned by Elisha K. Kane. The maximum grades are 1.6 per cent. and the maximum curves are 18 degrees.

Knoxville Western.—The company has been incorporated in Tennessee by J. F. O'Brien, J. H. Keeling, A. W. Schenck, C. O. Jenkins and B. R. Hutchcraft, to construct a road from Cookeville to Big Creek.

Lehigh Valley.—The Schuylkill & Lehigh Valley road will probably be opened its entire length about the middle of August. It will be operated as the Pottsville division of the Lehigh Valley. The ballasting is now in progress between Schuylkill Junction and Schuykill Haven, Pa., a distance of about 30 miles.

Louisville & Nashville.—The company is to build a branch line of the Nashville, Florence & Sheffield road from Summertown, Tenn., to the works of the Napier Mining & Mfg. Co. Surveyors have been placed in the field, but the contract has not been let yet. The new branch will be 11 miles long.

Lynchburg & Durham.—The tracklaying was completed to Durham, N. C., 114 miles south of Lynchburg, Va., on July 16, but the line will not be placed in operation to that place until about August 15, when it is expected to have the surfacing finished. The road is now being operated as far as Roxboro', N. C., 83 miles from Lynchburg. The maximum grade is 80 ft. per mile and the maximum curves six degrees. There are seven iron bridges—two 300 ft. long, one 125 ft. long, and the others 100 ft. The road passes through the towns of Lynchburg, Rustburg, Windfall, Woodlawn, Naruna, Brookneal, Clarkton, Nathalie, Lennig, Crystal Hill, Houston, South Boston, Denniston, Black Walnut, in Virginia, and Woodsdale, Roxboro', Lyndhover, Farintosh and Durham, in North Carolina.

Mexican Southern.—The principal subcontractors on this line, Hampson & Stanhope, of the City of Mexico, have annulled their contract.

Montgomery, Tuscaloosa & Memphis.—The line of the road between Maplesville and Tuscaloosa is now covered with grading forces. The contractors hope to commence laying track on the line between Maplesville and the Alabama River in a few days. On the section between Montgomery and the Alabama River the road has been graded and the trestles erected over the entire distance, about seven miles. This section is now ready for the rails and crossties. This material has been delivered and the work of putting down the track will begin in a few days. The crossings on the Louisville & Nashville and Western lines are both arranged for. The purpose is to lay the track between the city and river as soon as possible, so as to be able to transport the material for building the bridge. The contractors are now at work on the foundation of the bridge, but the work cannot progress far until the material can be brought by rail.

Nashville, Chattanooga & St. Louis.—The bids for the construction of 25 miles of the Tennessee & Coosa road from Lytton, Ala., five miles north Attalla, to within about two miles of Guntersville were opened last week. There were nine bids, as follows: Allison, Shafer & Co., $147,860; O'Hearn Bros., $184,603; Dunn Bros., $168,086; Neely, Smith & Co., $154,691; McDonald, Shea & Co., $172,629; Serpell & Morris, $152,218; W. E. Darwin, $165,317; Elliott & De Bardeleben, $196,402. The contract was awarded to Allison, Shafer & Co., of St. Louis and Chattanooga. This firm was also awarded the contract for the cross-ties. Work will be commenced on the road immediately and 19 miles completed by Jan. 1, 1891, the remainder by May 1, 1891. The route from Guntersville northward has not yet been located, as it has not been decided where to locate the bridge over the Tennessee River.

New Orleans & Northwestern.—All the grading on the bluffs near Natchez, Miss. (including the switchback) to the large fill in the city has been entirely completed, and not more than 10,000 or 12,000 yards of earth remains to complete the cut east and west of Canal street to the station. If the work on the fill is not completed when the company lays the track between the station and the Mississippi river bank, the company will build a temporary trestle across it.

New Roads.—The Dominion Parliament will be asked at its next session to incorporate a company to build a road from Lake Ontario to Peterboro and Bobcaygeon, Ont., and thence to the Northern Pacific Junction line between Port Carling and Burk's Falls, and thence through Nippissing and Algoma to Sault Ste. Marie.

A contract has been awarded for the construction of a road from Addison Junction to Ticonderoga Village, N. Y., a distance of ten miles, with a branch half a mile in length to the mill of the Ticonderoga Pulp & Paper Co. Work will be begun Aug. 1, and the road will be finished in about three months. The road will, it is reported, be operated by the Delaware & Hudson Co.

Arrangements have been made for the immediate construction of a narrow-gauge road between the Town of Laidlaw, on the south side of Gray's Harbor, Wash., to North Cove, on Willapa Harbor, a distance of about 12 miles.

A survey is being made by the Okanogan Mining & Tunnel Co. for a railroad from a point near Okanogan, Wash., southeasterly about 30 miles, to connect with the Ellensburg & Northeastern. Two tunnels will probably be necessary, one of them about a mile long.

Northern Pacific.—The following are the subcontractors under Griggs & Heustis, of Tacoma, Wash., on the Tacoma, Olympia & Gray's Harbor road, from Centralia west to Gray's Harbor: Matthews & Krech, of St. Paul, who have all the tracklaying and bridge building; F. Erickson, 21 miles of grading and clearing right of way; W. C. Smith, 13 miles of grading and clearing, and Sims & Foster, five miles; J. H. Pope, 10 miles clearing right of way, only; J. H. Matteson, five miles grading and clearing right of way; A. H. Adams, five miles clearing and grading; Nelson & Turnberg, eight miles grading and clearing; W. H. Parker, 10 miles grading and clearing; James Lee, 12 miles grading; Brown, Graham & Co., 12 miles grading and 23 miles clearing, and the Oregon Construction Co., 15 miles grading and clearing.

The grading is well advanced, and some tracklaying has been done. The road is to extend from Tacoma through Olympia to Ocosta, on Gray's Harbor, a distance of 56 miles, with a branch from Centralia to Black River Junction, 21 miles.

The contracts on the Yakima & Pacific Coast have been sublet to A. E. Webster, of Portland, Ore. This line is being built from Chehalis to South Bend, Wash., on Shoalwater Bay, near the Pacific Ocean, a distance of 56 miles. Griggs & Heustis have the contracts for both lines, including all buildings, roundhouses, sectionhouses, machine shops, etc. About 2,000 teams and men are being employed at present. The clearing is very heavy and the grading also, on some sections. H. T. Huson, of Tacoma, is Principal Assistant Engineer. The Resident Engineers are, on the Tacoma, Olympia & Gray's Harbor, Charles Harlowe, with headquarters at Centralia; on the Yakima & Pacific Coast, W. C. Marrion, at Chehalis, Wash.

The Central Washington is to be extended from Grand Coulee, the present western terminus of line, to the Columbia River at a point near the mouth of the Okanogan River, this year, probably. The extension will be built up the valley of Okanogan River to Foster Creek, and thence up the valley of that stream to Conconully, in the centre of the Okanogan mining district. The distance from Grand Coulee to the minesis about 90 miles.

The locating survey between Black River and Kirkland for the Lake Washington belt line, is steadily progressing and grading will shortly be commenced. Material for construction is being shipped to Yesler on the Seattle, Lake Shore & Eastern. The contract has already been let.

The Duluth & Manitoba branch will probably build a cut-off this fall between Red Lake Falls, Minn., and West Lynne, Man. The right of-way agent of the road is now endeavoring to secure aid from the towns through which the road will pass, as well as right-of-way and station facilities.

The Northern Pacific & Montana announces the completion and opening, as a part of the Montana division of the Northern Pacific road, the Red Bluff extension, from Sappington to end of track, 20.9 miles; the Pony extension, Harrison to Pony, 7.1 miles; Elkhorn extension, Boulder to Elkhorn, 20.5 miles.

Peace River & Boca Grande.—This company has been incorporated in Florida by M. F. Knudson, M. T. Singleton, J. L. Sandlin and Grove Cochran to construct a road from the headwaters of the Peace River to Boca Grande, on Charlotte Harbor.

Pennsylvania.—The survey for the line between Reading and Middletown, Pa., on the Susquehanna River, some miles below Harrisburg, is still in progress. The survey is now being made between Lebanon and Middletown. The line is about 50 miles long, and parallels the Philadelphia & Reading. The survey connects with the Schuylkill Valley division of the Pennsylvania about half a mile south of the station at Reading.

Port Arthur, Duluth & Western.—The tracklaying between Port Arthur and Fort William, Ont., on this road, has been completed. Trains now run to Stanley Crossing, or within five miles of Beaver mine, over 20 miles in all being laid.

Portland & Puget Sound.—The contract for building this road, which was awarded to Kilpatrick Bros. & Collins, of Beatrice, Neb., some time ago, has been signed. J. H. Smith has the sub-contract for most of the grading on the line.

Port Townsend & Southern.—The first five miles of the 20 miles of track on the road south from Port Townsend, Wash., has been ballasted. The work on the other 15 miles is being pushed as fast as possible. The line between Port Townsend and Quilcene is nearly completed, and a large number of the men have been withdrawn and sent to work at the head of Hood's Canal, toward Olympia.

Prince Albert, Hudson's Bay & Pacific.—The Dominion Parliament will be asked to incorporate this company to build a line from Prince Albert, N. W. T., to Fort Churchill or Port Nelson on the Hudson's Bay, or to connect with the Winnipeg and Hudson's Bay road north of the Saskatchewan River; also to build a line from Prince Albert northwesterly by Lesser Slave Lake, through either the Pine River or Peace Pass to Fort Simpson or Skeeha on the Pacific coast.

Rockaway Valley.—The company is still securing subscriptions to aid it in building the projected extension from Pearpack to Mendham, N. J., a distance of about six miles. About $7,000 is still to be raised before work will be commenced.

Rome, Watertown & Ogdensburg.—Press dispatches state that the right of way for the Buffalo, Thousand Islands & Portland has been secured between Buffalo and Suspension Bridge, 20 miles, and that construction will soon commence. This is misleading. The right of way for the line is being secured, but it is a slow work, and the greater part has yet to be obtained. The locating survey has not yet been made. The company has no profiles of the line, and it has not therefore been able to closely estimate the cost of the route. It expects to have this work completed some time in the fall, and to let the contracts then, but no definite date can be given. The matters may not be arranged until October, and again they may be delayed even beyond that date. It is intended to let the contracts and make a beginning on the road this year, but of course, the greater part of the work must be done next year.

Seattle, Lake Shore & Eastern.—The San Francisco Bridge Co. has completed the draw bridge crossing the Stillaguamish River. The tracklaying has commenced on that part of the northern extension. The track is already completed to the river, making 61 miles of track laid north of Seattle. Three miles of track have also been completed north of Sedro. The 4,800-ft. north approach to the bridge which will cross the Skagit river has been completed, as has also the north abutment. The 2,305-ft. south approach is now well under way. Piles are also being delivered on the north fork of the Nooksack and will be driven in a few days. From that point north the 20 miles of grading has been finished and the road bed is now ready for tracklaying, which will be commenced as soon as the Canadian Pacific delivers the material. Contracts for the company's portion of the work south to the boundary line have been let to Morrissey & Whitehead. The clearing and grading has already been started, and if the weather continues favorable this work will be completed by Oct. 1. Two spans of the bridge crossing the Fraser River have been completed and four more are ready to be placed in position. The longest uncompleted section is now between the Stillaguamish River and Sedro, a distance of 21 miles. Large forces of men are at work grading between these two points, and the tracklaying will be done as fast as the grading is finished.

Seattle & Montana.—The contract of Shepard & Co., of St. Paul, Minn., on this road is for the first 77 miles from Seattle, Wash., north to the connection with the Fairhaven & Southern. The San Francisco Bridge Co. has the contract for the trestles and bridges. This part of the road is to be completed by next December. The line as at present located extends from Seattle northerly along the shore of Puget Sound, crossing the Snohomish River near its mouth and passing through Marysville and across the Stilaguamish River east of Stanwood, thence to Mount Vernon, and across the Skagit River to a connection with the Fairhaven & Southern, now owned by the Great Northern Co. This makes a continuous line from Seattle to New Westminster, B. C., connecting at that point with the Canadian Pacific. D. H. Gilman, of Seattle, is President and W. P. Watson, also of Seattle, is Chief Engineer.

The ballasting of the road from Anacortes to Sedro, Wash., is nearly completed, and the tracklaying is being rapidly pushed to Hamilton. Regular trains will be run between the first two above named points as soon as the equipment arrives in a few days.

Sioux City & Northwestern.—This company has been incorporated in Iowa, by officers and others interested in the Sioux City & Northern road. The road is to be built westerly across northern Nebraska, and through the Sioux Indian Reservation in South Dakota, in the direction of the Black Hills.

Tacoma Eastern.—This company has been incorporated in Washington with a capital stock of $250,000 to build a road in Washington from Tacoma eastwardly.

Terre Haute & Indianapolis.—This company will begin the operation of the Indiana & Lake Michigan road, extending from South Bend, Ind., north to St. Joseph, Mich., a distance of about 40 miles, on August 4. The jurisdiction of the general officers of the company has been extended over the new line, which will be operated in connection with the Terre Haute & Logansport division.

Toledo & Chicago.—The special election held at Goshen, Ind., July 25, on the proposition to vote aid to the road, resulted in favor of the proposition. A two per cent. tax will be levied upon the assessed value of the property of the townsnip. One-half of the bonus is to be paid as soon as the cars are running from Toledo through the township, and the remainder when the sum of $50,000 has been expended by the company in the erection of shops at Goshen.

Union Pacific.—The grading on the branch from La Grande north to Elgin, Or., is now practically completed. The bridge across the Grand Rond River, near Island City, has been finished. There is still some grading to be done at this point. A large part of the rails has already arrived, and tracklaying is to begin shortly.

Union Pacific, Denver & Gulf.—The Maxwell Branch extension has been completed for part of the distance, and trains are now running to Pels. The length of the extension completed is nine miles.

West Virginia & Pittsburgh.—The Mongahela River division has been extended from Shinnston south to Clarksburg, W. Va., thus completing the entire line between Clarksburg and Fairmount, 33 miles, and connecting with the Baltimore & Ohio at the latter point.

West Shore.—A preliminary survey is being made for a proposed extension of the Walkill Valley road from a

point near Walden to a connection with the West Shore a few miles north of Newburg, N. Y. The survey is being made to estimate the cost of the line. It has not been decided to build the line, nor whether a locating survey will be made.

Wilmington, Onslow & East Carolina.—The track of the road has been laid from Wilmington to Sandy Run, N. C., a distance of 23 miles. The road has not yet been formally opened between these points, but freight and passenger business is being carried.

Zig-zag.—This company has been recently organized at Portland, Me., to build a road 1½ miles long at that place. W. C. Foster, of 52 Broadway, New York, will probably build and equip the line. It crosses from the harbor to the ocean side of Cisco Island in Portland Harbor, and will be used principally as a summer resort road.

GENERAL RAILROAD NEWS.

Chicago & Atlantic.—The Receiver has submitted the annual report of the road for the year ending June 30, 1890, which shows gross earnings of $2,700,000, an increase over the previous year of $519,000. The increase in net earnings over the previous year amounted to $335,200. The gross earnings for the year per mile were $10,037, and net earnings $2,630. The extraordinary repairs were $350,000. The Receiver has paid of antereceivership indebtedness $615,000, and of the Chicago & Atlantic interest in the Chicago & Western Indiana road, interest and sinking funds, $222,658. This makes a total extraordinary expenditure by the Receiver of $1,187,658, all of which came out of the earnings of the road. In addition to the ordinary track repairs the Receiver has ballasted with gravel 76 miles of track, taken out 111 condemned bridges, substituted iron drain pipe, filled openings and made many other permanent improvements. There were taken out 9,704 ft. of trestling, and two new iron bridges and abutments requiring 800 cu. yds. of masonry were erected. Six thousand feet of condemned trestling was fully renewed.

Chicago, Burlington & Quincy.—The statement of earnings and expenses for June is as follows: Gross earnings, $2,740,583, an increase of $56,523; expenses and charges, $2,759,583, an increase of $320,775; deficit, $19,000; from Jan. 1 to June 30: Gross, $16,937,024, an increase of $1,590,498; net, $1,020,247, an increase of $728,458.

Illinois Central.—The Board of Directors of the company has decided to prepare a recommendation to the stockholders that the capital stock be increased $5,000,000, or made $45,000,000. Stockholders of record on Sept. 20 will have the privilege of subscribing at par to one share of new stock for every eight shares held. The proposition to issue $5,000,000 of new stock will be submitted to the annual meeting of stockholders, to be held in Chicago Oct. 8. It is stated that the office and station building will face 220 ft. on Water street and 120 ft. on Central avenue. The building will be of brick, with trimmings of stone and terra cotta. It will be 7 stories high, while the train sheds will be 740 ft. long.

New York, Lake Erie & Western.—The following statement shows the earnings of the system for June and the nine months to July 1:

Month of June.	1890.	1889.	Inc. or dec.
Gross earnings	$2,426,790	$2,311,604	I. $115,186
Oper. expenses	1,621,991	1,490,055	I. 131,936
	$804,799	$821,549	D. $16,750
Less proportions due leased lines	175,475	205,895	D. 30,420
Net earnings	$629,324	$615,654	I. $13,670

Nine months, Oct. 1 to July 1.	1890.	1889.	Inc. or dec.
Gross earnings	$21,196,411	$19,160,998	I. 2,035,412
Oper. expenses	13,981,315	12,531,419	I. 1,449,896
	7,215,096	6,629,579	I. 585,515
Less proportions due leased lines	1,881,151	1,707,840	I. 172,311
Net earnings	5,334,945	4,921,739	I. 413,205

Northern Pacific.—In regard to the report that the Northern Pacific and the Baltimore & Ohio would make a junction in the western suburbs of Chicago for the formation of a new transcontinental line, and that they had bought 380 acres of land there for their joint use, it is stated that while the Northern Pacific has bought 380 acres of land in the locality mentioned, it is for its own additional trackage, and the Baltimore & Ohio has nothing to do with it whatever. Another report is that the Northern Pacific and Wisconsin Central were buying a new right of way into Milwaukee, and would establish their own terminals there at a cost of some $7,000,000, so as to be independent of the Chicago, Milwaukee & St. Paul, whose terminals they are now using. The Northern Pacific officers, however, say that neither the Northern Pacific nor the Wisconsin Central, as corporations, have taken any action whatever toward the accomplishment of any such scheme.

This company, which has an immense amount of land in North Dakota under its land grant, has representatives before the county boards of equalization in counties where these lands are located, for the purpose of getting a fair assessment, and it is announced that the company is preparing to pay taxes on the lands. This tax will not be in lieu of any gross earnings tax, and will amount to a very large sum. The company has hitherto resisted the payment of this tax, and the matter has been in the courts for several years past.

Philadelphia & Reading.—The statement of the business for the month of June, 1890, as compared with the same month of 1889, is as follows:

Traffic:	1890.	1889.	Inc. or dec.
Gross receipts	$1,807,087	$1,536,732	I. $330,355
Op. ex., exc. rent and int.	954,569	1,112,276	D. 157,707
Profit in operating	$912,518	$424,456	I. $488,062
Other sources:			
Net receipts	41,966	34,659	I. 7,307
Profit for month	954,484	459,115	I. 495,369
Profit from Dec. 1 to date	$4,801,656	$4,153,920	I. $647,736

Richmond & Petersburg.—A mortgage deed was filed July 25 in the Chancery Court, at Richmond, Va., by the company, in favor of the Central Trust Co. of New York, on the road, rolling stock and equipment to secure the payment of bonds to the amount of $1,000,000 and interest. These bonds were issued by the company for the purpose of laying a double track from Richmond to Petersburg.

St. Louis, Alton & Terre Haute.—A special meeting of stockholders is to be held in St. Louis, Oct. 3, to consider the proposition to sell the main line of the road and the Alton branch to the Cairo, Vincennes & Chicago for $10,000,000. This is the division which is at present operated by the Cleveland, Cincinnati, Chicago & St. Louis. The proposition has received the endorsement of the board of directors.

St. Louis, Arkansas & Texas.—The United States Circuit Court for the Eastern District of Texas, on July 23 issued the decree for the sale of this road. The sale is to take place in Waco, Tex., at such a time as may be fixed by Special Master in Chancery, Judge F. N. Read, of Dallas, and the attorneys. This sale will include all of the Texas Division, the order having been given several days ago for the sale of the road lying outside of the state, the sale to take place in St. Louis.

St. Louis, Iron Mountain & Southern.—The company has filed for record at Pine Bluff, Ark., a copy of a mortgage for $45,000,000, made in favor of the Central Trust Co. of New York City.

St. Louis & San Francisco.—The directors this week voted to pass the usual dividend on the first preferred stock. This stock has generally had seven per cent. annual dividends. The last dividend in February was 2½ per cent. The following is a comparative statement of the operations of the road for the six months ending June 30:

	1890.	1889.	Inc. or Dec.
Gross earnings	$2,895,879	$2,582,010	I. $313,869
Oper. expenses	1,747,268	1,525,058	I. 222,210
Net earnings	$1,148,611	$1,056,952	I. $91,659
Other income	22,492	.....	.....
Fixed charges	1,328,097	1,275,174	I. 52,923
Deficit	$156,994	$218,222	D. $61,228

Included in the charges of 1890 are $69,114 for improvements. The amount so included in 1889 was $15,231.

Sonora.—The Mexican government has just made arrangements to pay $30,000 per month to the company until its indebtedness to that corporation is discharged. The government agreed to pay a subsidy of $16,000 per mile for the construction of the line and about $3,800,000 was paid. When the Atchison, Topeka & Santa Fe took possession of the line, the subsidy payments stopped. The line is 365 miles long and crosses the state of Sonora, from Nogales to Guaymas. The amount still due the company is $1,400,000. The debt has been owing eight years.

Union Pacific.—The summary of the earnings and expenses of the company for June and the six months to June 30 is as follows:

Month of June—	1890.	1889.	Inc.
Gross earn.	$3,793,862	$3,329,187	$464,675
Oper. expen.	2,277,157	1,834,401	442,756
Net earn.	$1,516,705	$1,494,786	$21,919
Six Months—			
Gross earn.	$19,801,750	$16,804,347	$2,997,403
Oper. exp.	13,903,174	10,964,039	2,939,135
Net earn.	$5,898,576	$5,840,308	$58,268

Union Pacific, Denver & Gulf.—The company announces that on Aug. 5 next it will begin the issue of its five per cent. first mortgage bonds to replace the outstanding bonds of the Denver, Texas & Fort Worth, the Denver, Texas & Gulf, the Fort Worth & Denver, the Pan Handle, the Chicosa Cañon, and the Cañon de Agua Companies. The issue of the new bonds is limited to $25,000 per mile of completed single-track road and $35,000 per mile of completed double-track road of the Union Pacific, Denver & Gulf, and the bonds will constitute a first mortgage lien on all the railroads and equipment of the company as rapidly as bonds of the constituent companies are retired. The payment of interest on the bonds is provided for by a traffic contract with the Union Pacific.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, July 30, 1890.

The report of the committee of presidents and general managers of the Western lines, which was briefly referred to in my dispatch last week, was finally perfected and agreed to by the lines in interest on Friday. It provides for a restoration of the following eastbound rates from Missouri River points to Chicago:

	Present rate.	Rest. rate.
Cattle	12½	22
Hogs and sheep	22	25
Dressed beef	18½	23½
Packing house products	12	18

At the meeting of the Western Freight Association to-day these rates were agreed to, to become effective as soon as they can be checked up and tariffs legally issued.

Rates on grain were left to each line to make in conformity to association rules, no general understanding being arrived at. Accordingly, after the conference the Alton gave notice for the meeting to-day that it proposed to put in a rate of 20 cents per 100 lbs. on wheat, rye and barley, and 15 cents per 100 lbs. on corn and oats, from Kansas City to Chicago, thus reducing the rate on wheat 2½ cents and corn 5 cents. This question, however, was not reached to-day. Rates on lumber were also discussed, but no adjustment was made at the conference, this being left to the five chairmen to adjust, on the question of differentials between white and yellow pine. The question is still in the hands of the committee. The Southern roads insist that there shall not be more than six cents difference in the rates on Northern and Southern pine. Northern roads want eight cents difference, but it was found impossible to compromise on seven cents.

The question of a division of competitive freight traffic between southwest Missouri River points, Mississippi River and Chicago was finally referred to Chairmen Walker, Midgley, Fairthorn, Finley and Goddard to make such arrangements as would insure to each line its proper share, this adjustment to be effective Aug. 1 and continue in effect for 90 days, subject thereafter to 30 days' written notice of any line desiring to readjust or withdraw from it.

Chief Inspector Paul P. Rainier, of the Joint Rate and Inspection Bureau, has made a report charging the Chicago, St. Louis & Pittsburgh with manipulation of rates extending over a period of several months. The Illinois Steel Co. received 1,640 cars of coke on which it appears that the road reduced the rate to the extent of $4,291.73. The manipulation was done by charging the proportion of the through rate to Chicago instead of the local rate. The regular rate to Chicago is $2.75 a ton, and Joliet takes the Chicago rate. The proportion of the through rate to Chicago is $2.35. The coke was billed through to Joliet at $2.75 via the Panhandle and Chicago & Alton, and on arrival at Chicago was stopped and delivered to the Illinois Steel Co. at its side track and the Panhandle collected only $2.35 per ton.

Chairman Blanchard has issued a circular authorizing that the new bill of lading shall be stamped "Not negotiable except as provided in condition 9 hereof," when the property represented by such bill of lading is consigned "to order," etc., as provided in condition 9, and *is destined eastwardly from point of shipment.* When the property is consigned straight, the uniform bill of lading is to be adhered to. It is said, though, that shippers are still up in arms and that the Grand Trunk, which adheres to its old form, is getting many large shipments that have been withheld from other roads.

The Central Traffic roads, although at first inclined to maintain the 50 cent Chicago basis on wool to New York as against the St. Louis cut to 40 cents, have now decided to meet the cut, and have authorized the following rates, east-bound from Chicago, to be maintained as strictly local rates: New York, 34½ cents: Boston, 39½ cents; Philadelphia, 32½ cents; Baltimore, 31½ cents; Buffalo, Pittsburg, Wheeling, etc., 19½ cents. These rates are a reduction of 15½ cents in each case.

Advance copies of the proposed new uniform classification have been sent out.

W. F. Merrill, who is to be General Manager of the Chicago, Burlington & Quincy, was in the city last wee making arrangements for establishing his headquarters here Aug. 1.

E. P. Ripley sailed from Liverpool the 23d, and expects to reach Chicago this week, and will assume the duties of Second Vice-President of the Chicago, Milwaukee & St. Paul soon after.

Traffic Notes.

A bill has been introduced in Congress authorizing reduced one way party rates for parties of seven or more passengers.

The Secretary of the North Dakota Railroad Commissioners says the report that elevators would refuse to store grain as public warehouses this year was much exaggerated.

The Norwich line, connecting with the New York & New England, will run four extra steamers from New York on Aug. 10 and three on Aug. 11 to take passengers to the G. A. R. encampment at Boston.

The principal railroads met the Kansas Railroad Commissioners last week and discussed the new local freight tariff, protesting against the 20 per cent. reduction proposed by the commissioners. The roads expressed willingness to make some reduction, however, and the conference was adjourned to Aug. 4.

A Pullman sleeping car now runs between Hornellsville, N. Y., and Boston by way of the New York, Lake Erie & Western and the New York & New England, crossing the Hudson River by transfer boat at Newburg. Two of the Erie express trains now connect daily at Greycourt for Boston by this route.

The National Association of General Baggage Agents, at its recent meeting in Chicago, resolved to be more careful with regard to the shipment of dogs, muzzling or crating being insisted upon. All the seaboard lines westward have agreed to adopt the special check for foreign baggage previously adopted by the association.

Competition between the Pennsylvania and the Philadelphia & Reading for excursion traffic to the New Jersey sea shore resorts is now very sharp, and has resulted in rates of less than half a cent a mile. The Reading published a page advertisement in one of the Philadelphia papers, half of the space being taken up with a picture of the New York and Philadelphia two-hour train.

It has been decided by the Central Traffic Association that the votes cast on requests for authority to make commodity rates should be considered in the nature of ballots or privileged communications, and that the chairman should not exhibit them to members. In some cases the adverse votes of individual members have been communicated by rival lines to shippers as an unjust means of diverting traffic.

The New York, Lake Erie & Western has decided to discontinue the running of tourist (second class) sleeping cars on Aug. 1. They have been used considerably by excursion parties, and low rate excursion business has grown of late to large proportions. The larger roads have come to feel it very considerably, and, as now appears, they have induced the Erie to withdraw the tourist cars. The Fitchburg road has received the lion's share of this excursion business out of Boston, and it is now likely to suffer somewhat, as the lines from Boston to the West by way of the Canadian roads will continue to run the tourist cars.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, July 26, amounted to 56,161 tons, against 54,898 tons during the preceding week, an increase of 1,263 tons, and against 49,289 tons during the corresponding week of 1889, an increase of 6,872 tons. The following table gives the proportions carried by each road:

	W'k to July 26.		W'k to July 19.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	8,475	15.1	7,861	14.3
Wabash	3,652	6.5	3,436	6.2
Lake Shore & Michigan South.	10,049	17.9	9,525	17.4
Pitts., Ft. Wayne & Chicago	5,867	10.4	6,629	12.1
Chicago, St. Louis & Pitts.	6,900	12.3	5,603	10.2
Baltimore & Ohio	3,698	6.6	3,597	6.5
Chicago & Grand Trunk	6,389	11.4	6,913	12.6
New York, Chic. & St. Louis	4,822	8.6	5,685	10.4
Chicago & Atlantic	6,309	11.2	5,649	10.3
Total	56,161	100.0	54,898	100 0

Of the above shipments 1,455 tons were flour, 18,205 tons grain, 1,702 tons millstuffs, 6,881 tons cured meats, 2,671 tons lard, 10,215 tons dressed beef, 2,321 tons butter, 1,977 tons hides, 1,186 tons wool and 6,548 tons lumber. The three Vanderbilt lines carried 41.6 per cent. and the two Pennsylvania lines 22.7 per cent.